Inventory of Public Safety Communications Systems

Phase 2 report

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February 2005

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A message from the vice chair

I am pleased to present the *Statewide Inventory of Public Safety Radio Systems, Phase 2*, which is a product of the State Interoperability Executive Committee (SIEC).

This report provides an essential overview of today's public safety radio systems -- based on the contributions of local, tribal and state government agencies and organizations -- in the State of Washington. The participants' commitment of time and resources toward this project underscores their dedication to our underlying mission of safeguarding lives and property.

Our primary objective in this project is to enable all public safety agencies to communicate with each other, on demand and in real time. The next step in this project is to draw on this report and other relevant information to create a long-range *Technical Implementation Plan* (TIP). The TIP will be completed in June 2005 and, to ensure the success of our mission, will involve as many public safety organizations as possible.

We face significant challenges in our quest to achieve statewide interoperability that will enhance public safety and protect our emergency response personnel. On behalf of the SIEC, I request your ongoing support of this project. We simply cannot succeed without your assistance. Thank you.

Sincerely,

Chief James Broman
Washington State Fire Chiefs Association

Executive summary

This *Inventory of Public Safety Communications Systems – Phase 2 Report*, is a report of data collected from state and local government agencies within Washington state. This report supplements the Phase 1 inventory report that was published by the State Interoperability Executive Committee (SIEC) on July 30, 2004.

This report represents a critical source of information that will be used in the development of the *Technical Implementation Plan* (TIP), which is part of the SIEC's statewide interoperability plan and will be published later this year.

The information in this report came from three data collection sources conducted between October and November 2004:

- a Web-based survey
- stakeholder interviews
- statewide forum meetings

Approximately 200 responders accessed the Web-based survey; it was completed by 11 percent of the more than 1,400 agencies within the state's public safety and emergency response communities. The agencies completing the survey represent about 83 percent of the state's population.

A series of interviews was conducted with members of the SIEC, members of the SIEC Advisory Work (SAW) Group, and additional individuals representing a diverse group of users from state and local agencies and tribal nations. A representative from the Washington State Department of Information Services (DIS) and from Federal Engineering (FE) attended the interviews.

Nine forums were conducted, one in each Homeland Security region in the state. The forums were attended by more than 200 first responders representing an excellent cross-sample of the first responder agencies throughout the state.

The interview and forum findings were reported in greater detail in an earlier report, *High-Level Final Statewide Public Safety Communications Interoperability Plan*. Summary information is included for continuity. The focus of this report is the Web-based survey.

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1 Background

Information shared in forum meetings and interviews with SIEC and SAW Group members revealed that there are numerous technical, operational and process issues hindering interoperability across the state. For continuity, this section is a summary of the most prominent roadblocks to communications interoperability as expressed by the stakeholders. Ultimately, each issue must be addressed with a viable solution strategy that will support and enhance communications connectivity across the state.

1.1 Stakeholder regional forums

Regional forums were conducted over a four-week period in each of Washington state's nine Homeland Security regions (Figure 1). DIS and FE used e-mail, U.S. mail, phone calls and press releases to advise first responder agencies and interested parties about the meetings.

Discussion was structured around three areas: 1) introduction of the SIEC, its mission and responsibilities; 2) introduction of the planning effort, background information, objectives and deliverables; and 3) facilitation of discussions with respect to current systems and brainstorming ideas for future systems.

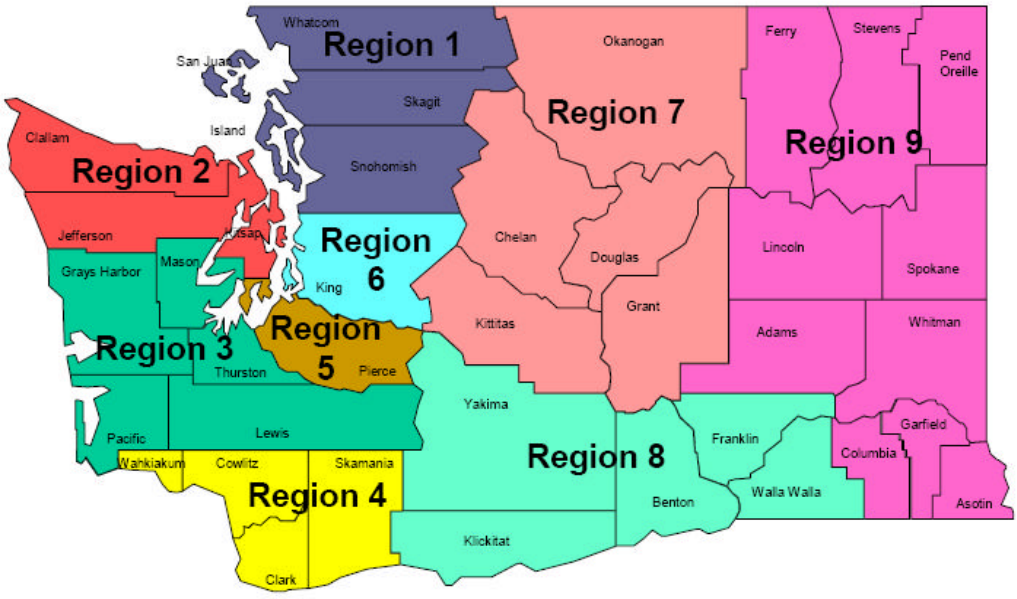


Figure 1 - Homeland Security regions

The objectives of the forums were to:

- introduce the statewide interoperability planning project, review objectives, discuss the inventory and brainstorm ideas regarding systems, improvements and modifications for the future;
- clarify the objectives for the project in terms of community needs and concerns and the relationship of the project to any relevant strategic plans, government policy directions and statutory or planning constraints;
- identify feasible alternative solutions and clarify their relative merits;
- prioritize issues and identify those key to the decision-making process; and
- identify performance objectives for key issues where possible.

General areas of discussion focused on:

- current operational needs
- what's working and not working today
- roles, responsibilities and governance
- future needs
- potential solutions
- how to get there

1.2 Stakeholder interviews

A series of interviews was conducted with SIEC members, members of the SAW Group and other individuals representing a diverse group of users from state and local agencies and tribal nations. A representative from DIS and from FE attended.

STAKEHOLDER	REPRESENTING
Chief Dave Stern Edmonds Police Department	SIEC Member, Washington Association of Sheriffs and Police Chiefs
Gummada Murthy Washington State Department of Transportation	SIEC Member
Pete Briglia Washington State Department of Transportation	
James Mullen Washington State Emergency Management Office	SIEC Member
John McIntosh Washington State Department of Fish and Wildlife	SAW Group Member
Frank Needham Jamestown S'Klallam Tribe	
Merle Holden Jamestown S'Klallam Tribe	

STAKEHOLDER	REPRESENTING
Marc Johnson Washington State Department of Natural Resources	SAW Group Member
Mark Kahley Washington State Department of Natural Resources	SIEC Member
Commissioner Mike Doherty Clallam County	SIEC Member, Washington Association of Counties
Chief Lowell Porter Washington State Patrol	SIEC Chair
Chief James Broman Lacey Fire Department	SIEC Vice-Chair, Washington State Fire Chiefs Association
Jim Hall Yakima County Office of Emergency Management	SAW Group Co-Chair
Scott Bream Washington State Department of Information Services	SAW Group Member
Clark Palmer Washington State Patrol	SAW Group Co-Chair
Sheriff Ken Irwin Yakima Sheriff's Office	SIEC Member, Washington Association of Sheriffs and Police Chiefs
Alan Komenski City of Bellevue	SIEC Member, Association of Washington Cities
Spencer Bahner King County	SAW Group Member
Don Miller Washington State Emergency Management Division	SAW Group Member
Tom Griffith Clark Regional Emergency Services Agency	SIEC Member, Washington State Emergency Managers Association
Bob Oenning Washington State Emergency Management Division	
Major General Timothy Lowenberg Washington Military Department	SIEC Member
Joe Huden Washington Military Department	

Table 1 - List of stakeholders interviewed

The stakeholders were very candid and forthcoming in their responses. They expressed support for the planning process. Altogether, the stakeholders were most sincere and enthusiastic about improving public safety radio interoperability in Washington.

1.3 Forum group participation

FE and DIS met with more than 200 first responders and interested parties during the four weeks of meetings and interviews, resulting in more than 500 person-participation-hours (Figure 2).

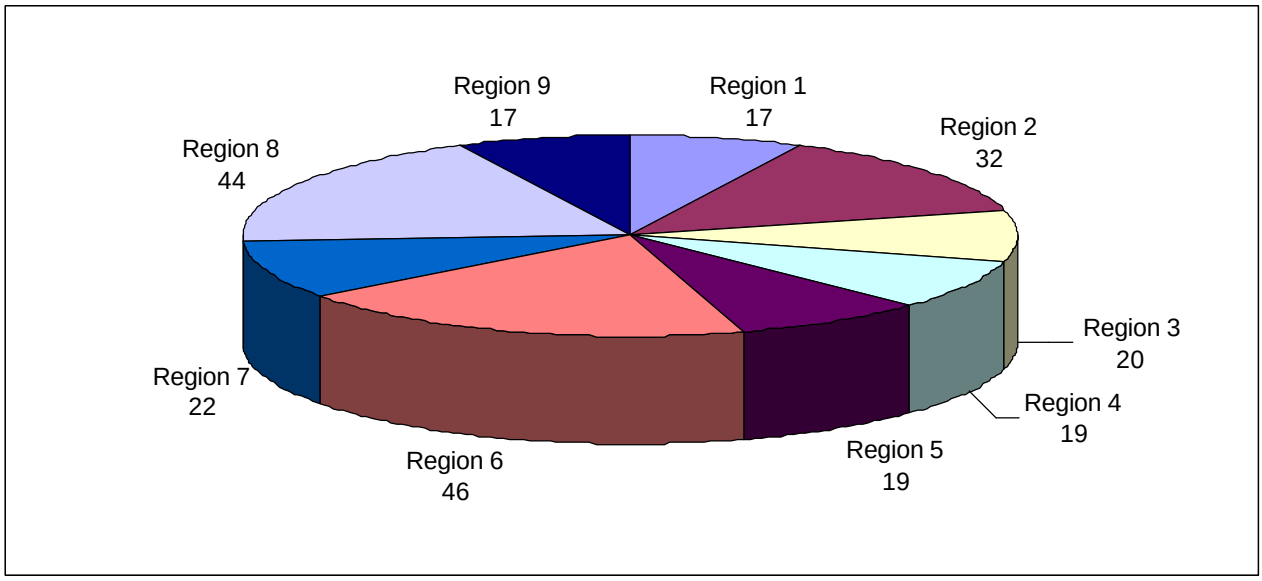


Figure 2 - Number of Homeland Security region participants

The forums were attended by an excellent cross-sample of first responder agencies throughout the state (Figure 3). The SIEC membership was well represented at the forums; seven members attended one or more meetings. A list of all attendees can be found in the *High-Level Final Statewide Public Safety Communications Interoperability Plan*, dated December 2004, Appendix 1 - Regional forum summaries, available on the SIEC Web site at http://www.isb.wa.gov/siec/siecpublications.htm.

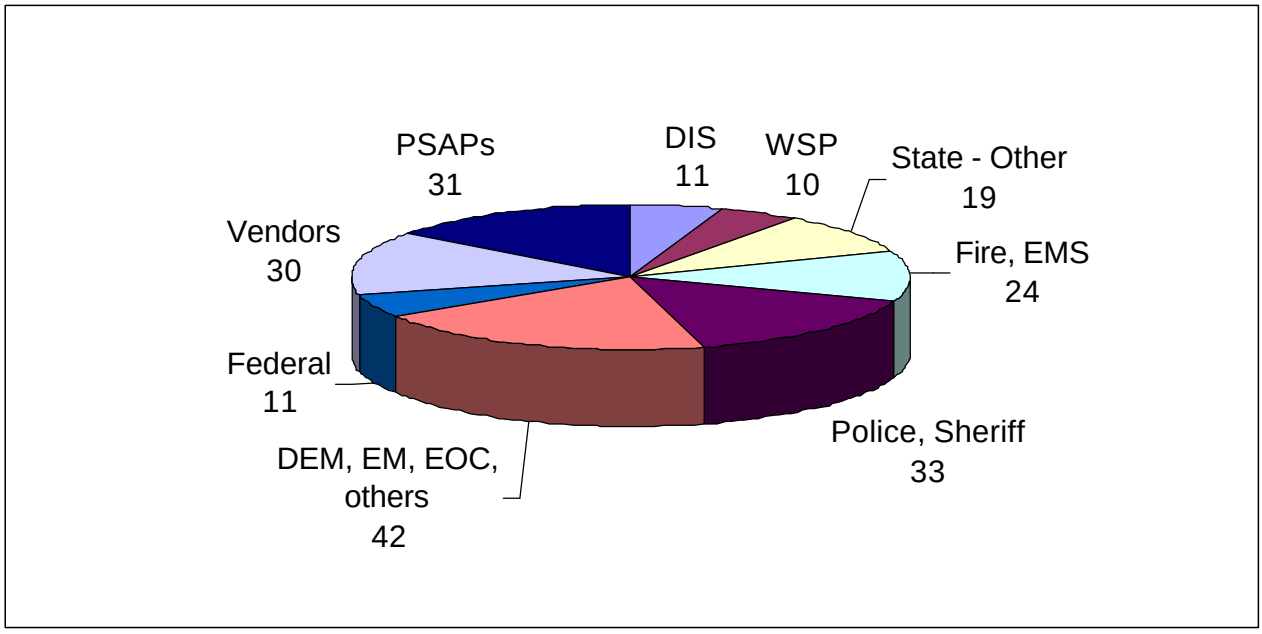


Figure 3 - Number of state agency participants

1.4 Summary

The interview and forum findings have been reported in detail in an earlier report, *High-Level Final Statewide Public Safety Communications Interoperability Plan*. Summary information is included for continuity. The report may be found on the state of Washington SIEC Web site at http://www.isb.wa.gov/siec/siecpublications.htm.

The focus of this report is the Web-based survey.

2 Radio inventory survey

2.1 Overview

The assessment and inventory phase of the project called for the development of a Web-based survey to collect radio communications asset data from public safety agencies at the state and local level, as well as from tribal nations, designated federal agencies and nongovernmental organizations. The data elements were specified by the state in their request for proposal and expanded prior to release of the survey. The survey instrument was designed to permit quick entry of data and navigation to sections of the survey of interest to the agency responding. See Appendix A for a copy of the survey.

2.1.1 Inventory methodology

FE worked with the SIEC staff to develop a Web-based survey that would build upon the information collected in December 2003 and July 2004. The survey was made available to all state and local agencies and tribal nations on October 11, 2004, and was announced through a series of e-mail and regular mail messages to Public Safety Answering Points (PSAP), regional Homeland Security coordinators, and first responder agencies. The initial deadline for completion of the survey was October 30, 2004, but it was extended to November 24, 2004, to try to increase the number of responses from state and local agencies. Additional efforts were taken by the SIEC staff and FE to focus on the larger agencies in each county, particularly those with a population of more than 30,000.

The following agencies participated in at least part of the survey:

- 197 agencies logged onto the survey site
- 176 agencies completed two or more sections of the survey

Though the profile of agencies varies from section to section, Table 2 shows the typical mix of number of responses by “description of agency mission” (based on entering information in the general section of the survey). See Appendix D for a list of agencies responding to the survey.

Agency mission	Responses
EMS - government operated EMS	2
EMS - non-government operated/private EMS	1
Fire - city fire department	24
Fire - county fire department/district	30
Fire - fire protection district	9
Fire - industrial fire district	1
Fire - volunteer fire district	2
Law enforcement - county jail	2
Law enforcement - police department	53
Law enforcement - sheriff's office	21
Law enforcement - tribal police department	3
Other - emergency management center	6
Other - PSAP	25
Other - public services	2
Other - public utilities	2
Other - search and rescue	1
Other - transit	1
Other - transportation	2
Other	11

Table 2 - Responses by state agency mission

The SIEC estimates that 83 percent of the state's population is represented in the completed surveys. The breakdown by Homeland Security region is shown in Figure 4.

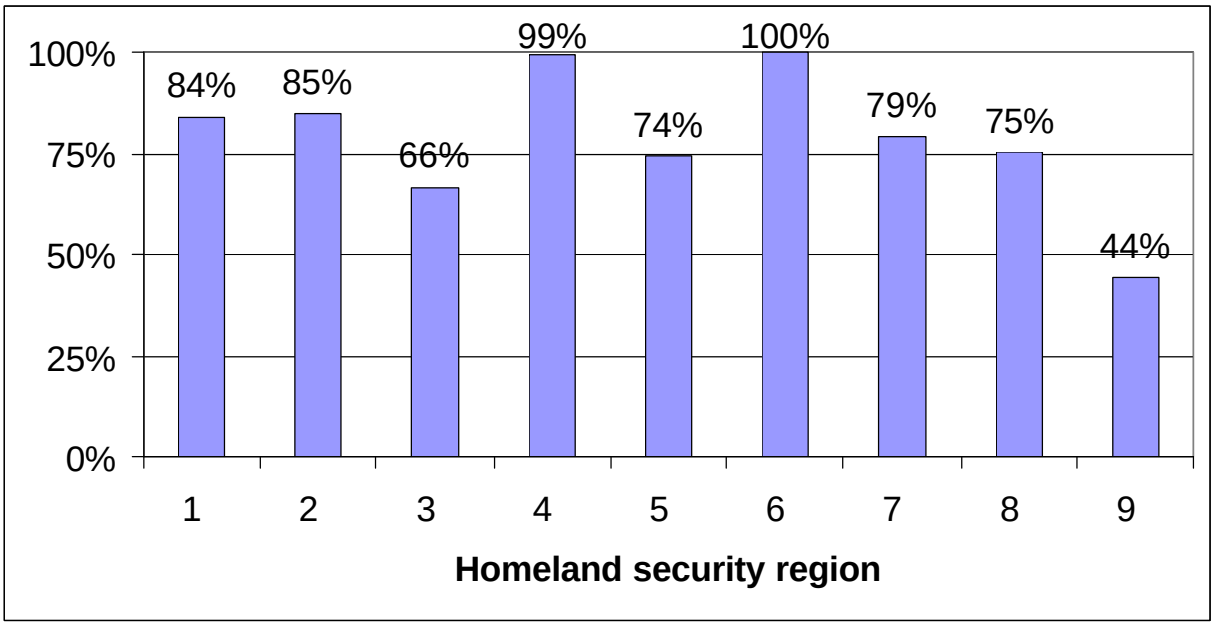


Figure 4 - Population represented in completed survey - by Homeland Security region

2.1.2 Data collection

The majority of the data reported here is based on what was collected in the survey. However, some minor modifications (see section 2.1.3) were made where obvious problems in the data appeared. For example, respondents appear to have completed those fields which they believed were most important or for which data was easily available. However, the reports are sufficiently accurate and complete enough to be used for high-level trend analysis.

The inventory followed the same general approach as the previous SIEC studies, collecting information in the following major areas of public safety communications assets:

- radio equipment
- infrastructure
- cellular and pager technology
- specialized interoperability equipment
- state radio frequencies
- command and control protocols

Additional areas of information were gathered during this study and are presented in this report.

2.1.3 Processing criteria for survey data

The following guidelines were followed to ensure consistent reporting of quantitative and attitudinal information for the survey findings:

- Each survey section was converted to Excel Worksheet format.
- Forty-seven agency representatives logged onto the Web-based survey, obtained a pass-code and did not enter information. These survey records are not included in this report. In many instances, information that would have been entered by these individuals was submitted by another agency.
- An “empty” survey section is not included in “counts” or “averages” in a chart or table. An “empty” section is defined as a section in the survey in which all responses in the section were not answered.
- Any item within a survey section that was not answered was changed to no response (NR). These included blanks, zero (0), NA, -, none, etc.
- Number responses that were found to be in a range, NA, -, <, >, and etc, were changed to a numeric value. A range was averaged; i.e., 2-5 was changed to 3.5; <3 was changed to 3. All other non-numeric responses were changed to NR.
- Content of text inputs were categorized and listed. Reports generated from text inputs were listed, compared and consolidated using names or common words.
- Generally, yes/no questions have been reported in a pie chart form.
- Generally, all other questions have been reported in a bar chart form.
- Some quantifiable data, such as the number of portable radios, mobile radios, base stations and consoles, were extrapolated based on the percentage of the region’s population that reported. Extrapolated quantities will be updated for budgetary purposes in the final report in May 2005.
- Data reported by state agencies is complete, and no extrapolation was required.
- Attitudinal, trend and pattern data were not extrapolated.

2.2 Technical - radio equipment

2.2.1 Overview

State public safety agencies were asked a series of questions to determine the types of technology and quantities of radios they were using.

In some cases, the reporting of information was done by a centralized group, which provides radio equipment and/or dispatch services for several nearby communities. This was most often done where the 9-1-1 center provides dispatching for several adjoining agencies and they were in the best position to provide accurate information on the radio equipment and infrastructure.

For continuity, this study used the same definitions as the previous inventory reports, collecting information on portable radios, mobile radios and base stations/repeaters.

Radio (portable, mobile and base station) equipment in this section is the quantities actually reported in the survey. The SIEC estimates that the quantities shown in the following tables/charts for the regions represent 83 percent of the total radio equipment for local and county agencies and tribal nations.

2.2.2 Portable radio equipment

Table 3 shows the number of portable radios reported in the survey by local agencies and tribal nations, grouped by Homeland Security region.

Portables	Homeland Security region									
	1	2	3	4	5	6	7	8	9	TOTAL
25-50 MHz	0	8	11	0	0	19	2	0	0	40
138-174 MHz	965	1055	935	729	1914	396	1081	578	1347	8999
220-222 MHz	0	0	0	0	0	0	0	0	0	0
406-470 MHz	389	215	65	105	875	104	14	0	16	1783
794-869 MHz	699	0	0	1668	860	8904	0	846	29	13006
P25 digital	71	42	15	103	976	94	39	95	47	1482
P25 capable/compatible	88	36	96	79	7	94	95	334	67	895
Digital, not P25	251	24	65	0	0	0	44	51	0	435
Narrowband - not P25	351	641	210	171	2000	0	281	32	923	4607
Analog only	1317	1265	785	1880	2505	9328	947	993	1144	20163
Trunked	635	4	81	1692	3	8904	0	771	0	12090
Conventional	1076	1305	777	679	2530	518	1048	910	1034	9877

Table 3 - Portable radios reported by Homeland Security regions

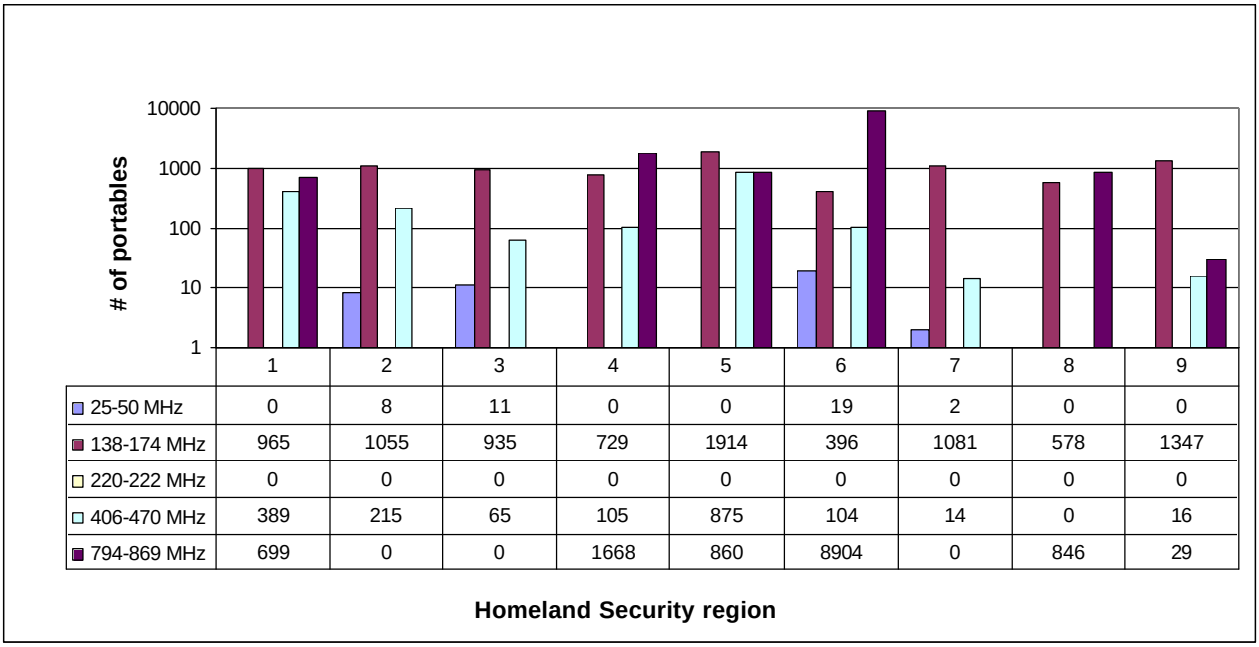
Table 4 shows the number of portable radios reported in the survey by state agencies. Agency abbreviations are as follows, for Table 4 and other tables throughout this report:

- EMD - Emergency Management Division
- DFW - Department of Fish and Wildlife
- WSP - Washington State Patrol
- DOC - Department of Corrections
- DNR - Department of Natural Resources
- DOT - Department of Transportation
- DOH - Department of Health

Portables	State agency							
	EMD	DFW	WSP	DOC	DNR	DOT	DOH	TOTAL
25-50 MHz	25	0	0	0	0	0	0	25
138-174 MHz	20	300	1790	0	1219	0	0	3329
220-222 MHz	0	0	0	0	0	0	0	0
406-470 MHz	0	0	0	0	0	0	0	0
794-869 MHz	11	0	0	3590	0	450	6	4057
P25 digital	1	0	132	0	0	22	0	155
P25 capable/compatible	0	175	0	4	1219	0	0	1398
Digital, not P25	1	0	0	0	0	0	0	1
Narrowband - not P25	2	78	100	3590	0	0	0	3769
Analog only	55	125	1390	2908	1195	428	6	6106
Trunked	4	0	0	610	0	428	6	1048
Conventional	52	300	1790	2908	1219	23	6	6297

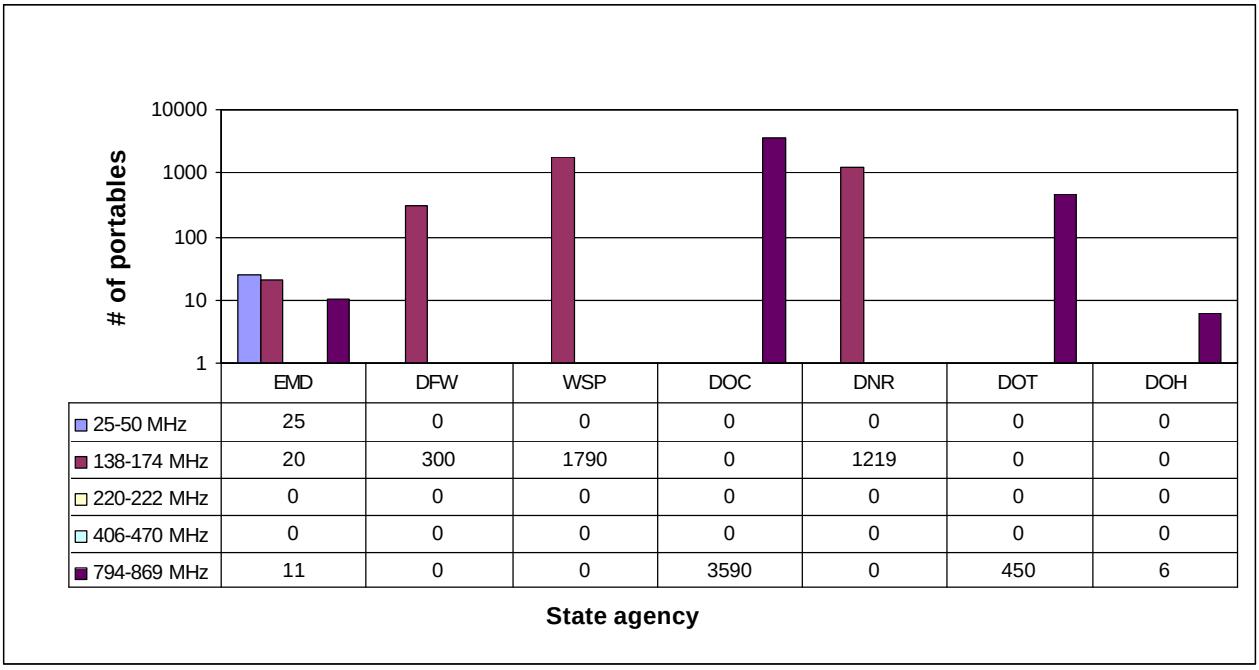
Table 4 - Portable radios reported by state agencies

2.2.3 Portables by frequency band



	1	2	3	4	5	6	7	8	9
25-50 MHz	0	8	11	0	0	19	2	0	0
138-174 MHz	965	1055	935	729	1914	396	1081	578	1347
220-222 MHz	0	0	0	0	0	0	0	0	0
406-470 MHz	389	215	65	105	875	104	14	0	16
794-869 MHz	699	0	0	1668	860	8904	0	846	29

Figure 5 - Portables by frequency band reported by Homeland Security regions



	EMD	DFW	WSP	DOC	DNR	DOT	DOH
25-50 MHz	25	0	0	0	0	0	0
138-174 MHz	20	300	1790	0	1219	0	0
220-222 MHz	0	0	0	0	0	0	0
406-470 MHz	0	0	0	0	0	0	0
794-869 MHz	11	0	0	3590	0	450	6

Figure 6 - Portables by frequency band reported by state agencies

2.2.4 Portable attributes

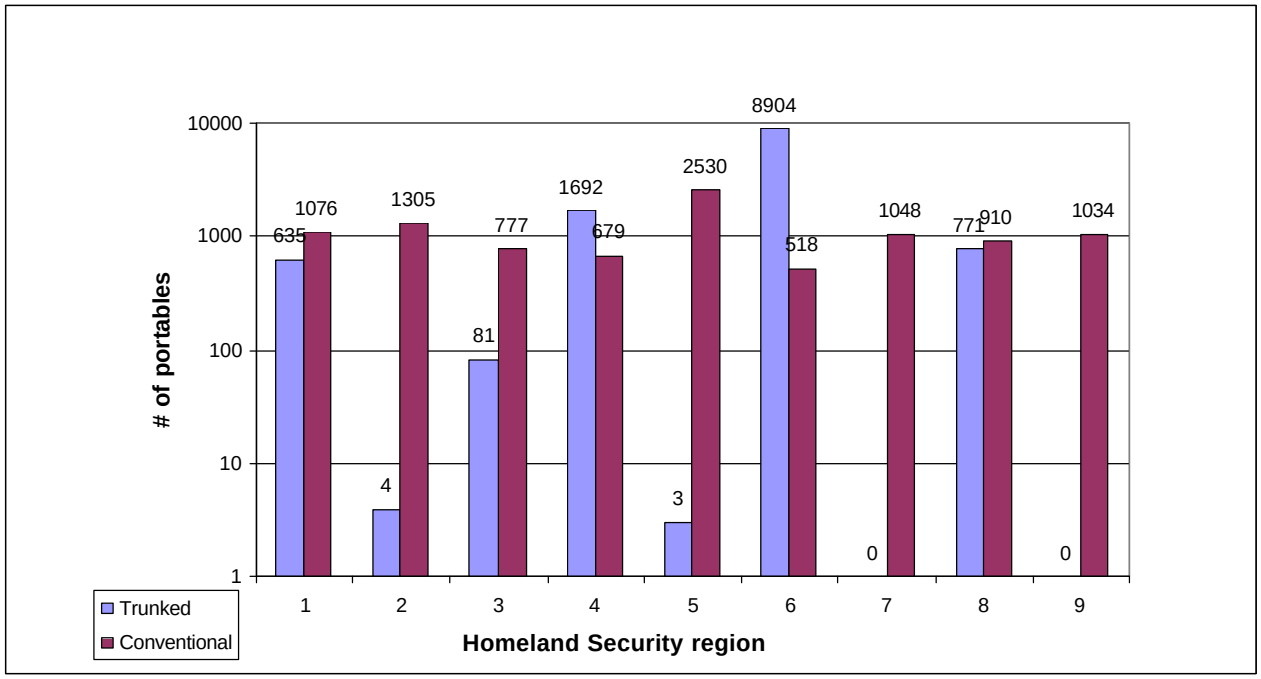


Figure 7 - Conventional/trunked portables reported by Homeland Security regions

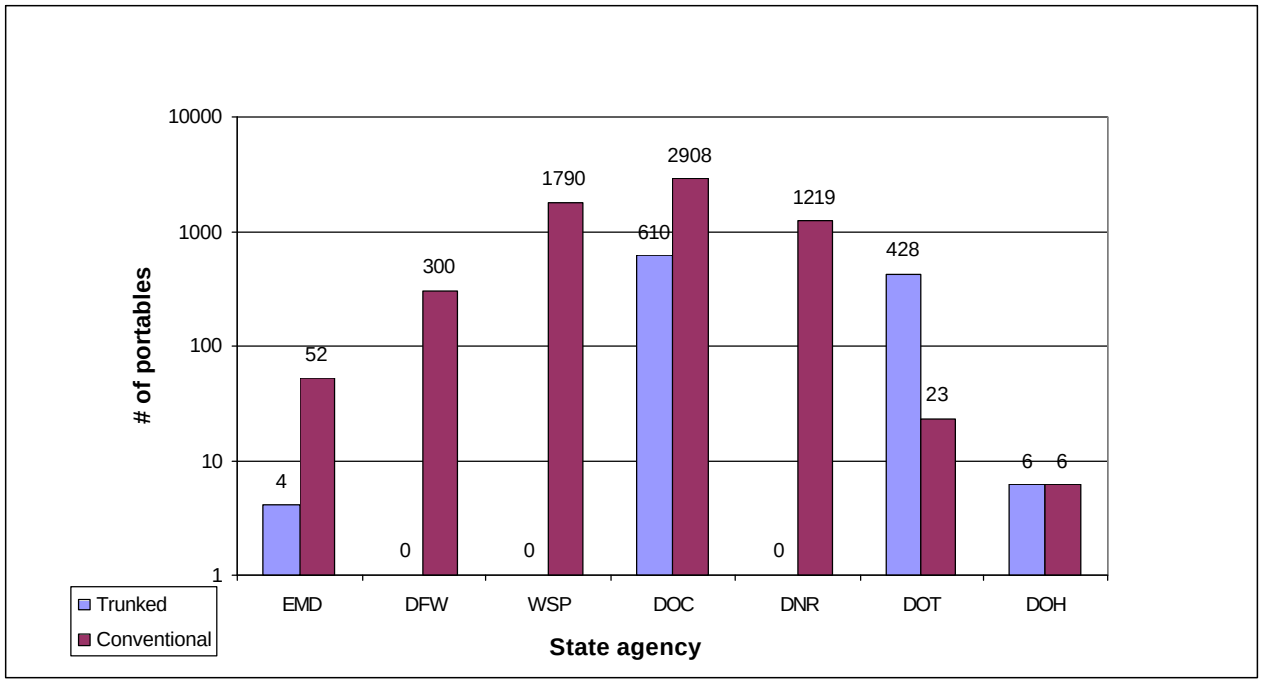


Figure 8 - Conventional/trunked portables reported by state agencies

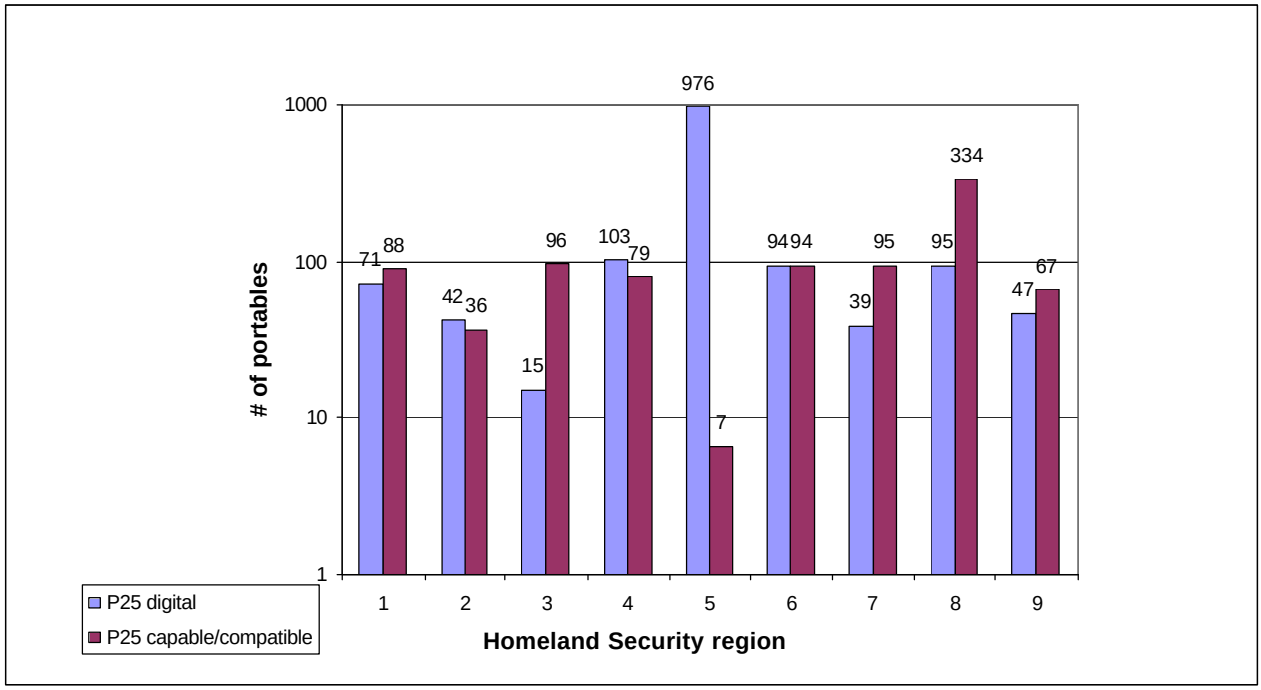


Figure 9 - P25 protocol portables reported by Homeland Security regions

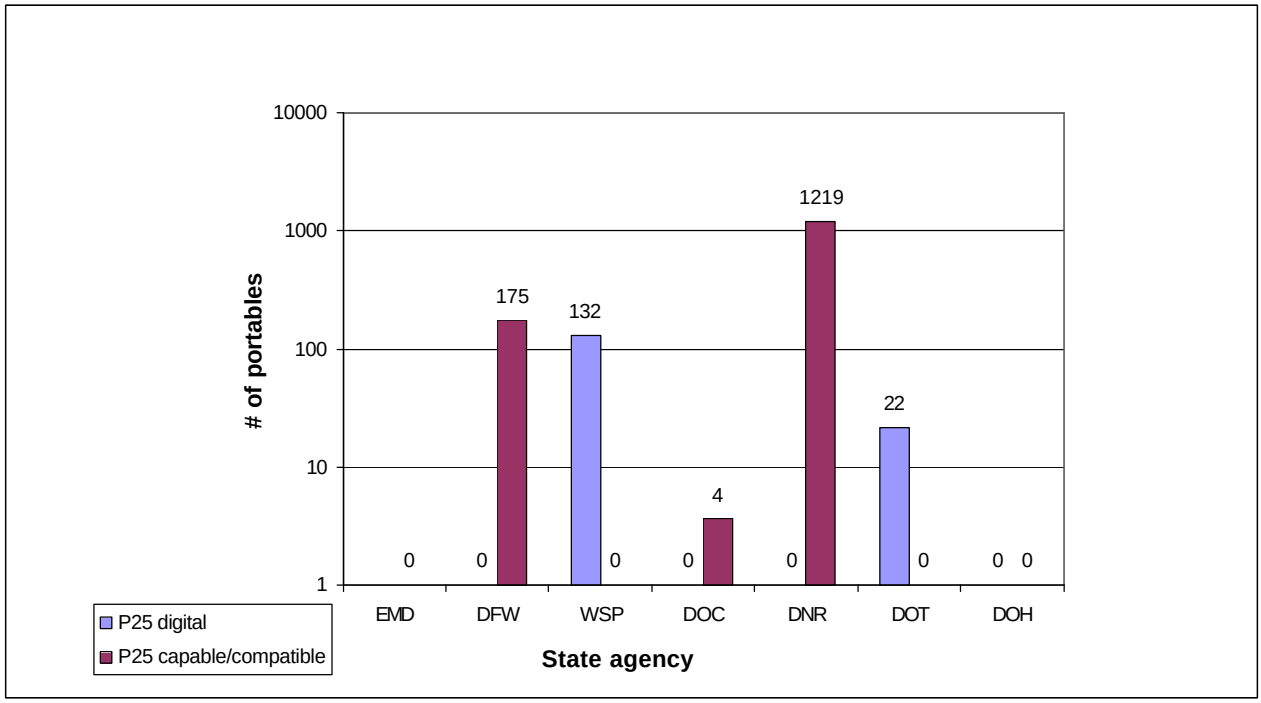


Figure 10 - P25 protocol portables reported by state agencies

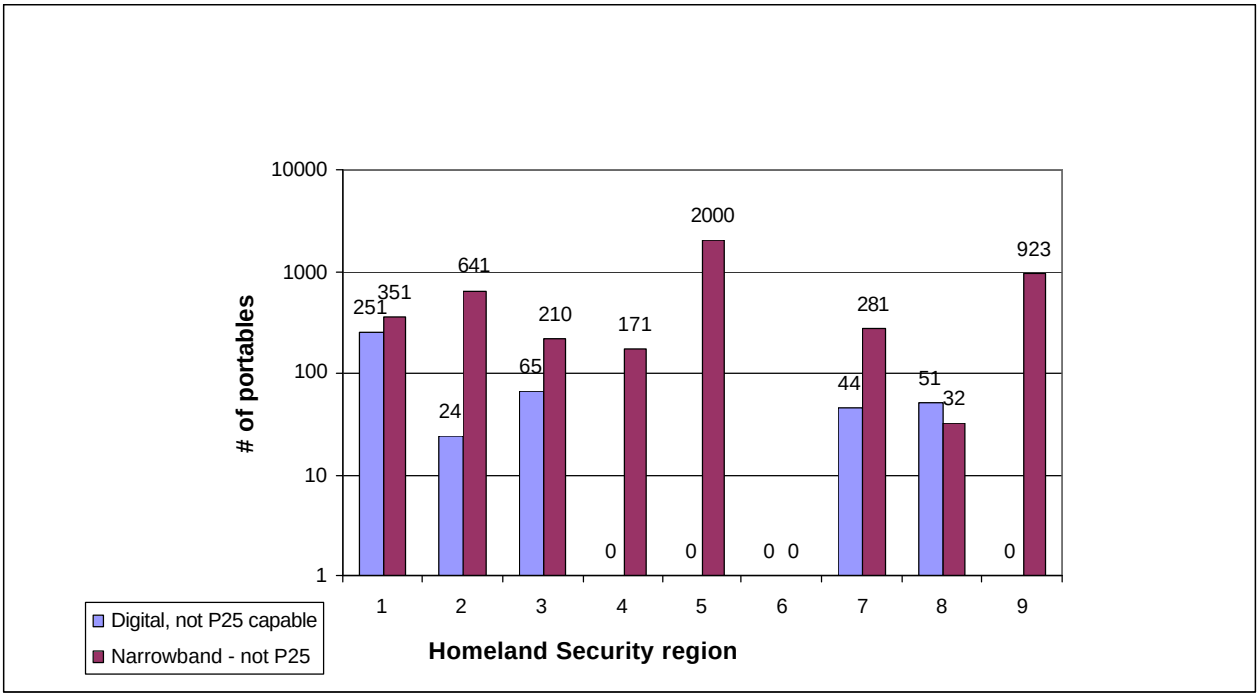


Figure 11 - Portables, digital and/or narrowband - not P25 capable reported by Homeland Security regions

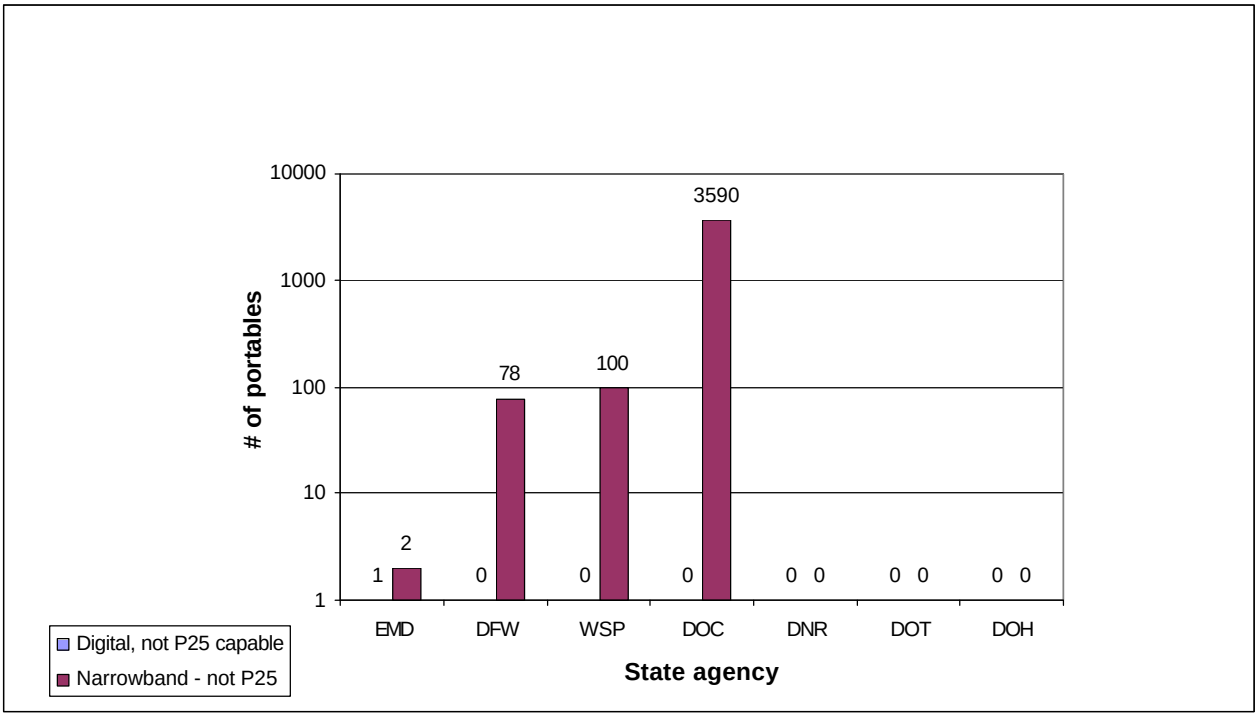


Figure 12 - Portables, digital and/or narrowband - not P25 capable reported by state agencies

2.2.5 Mobile radio equipment

Table 5 and Table 6 show the number of mobile radios reported in the survey by Homeland Security region and state agencies respectively.

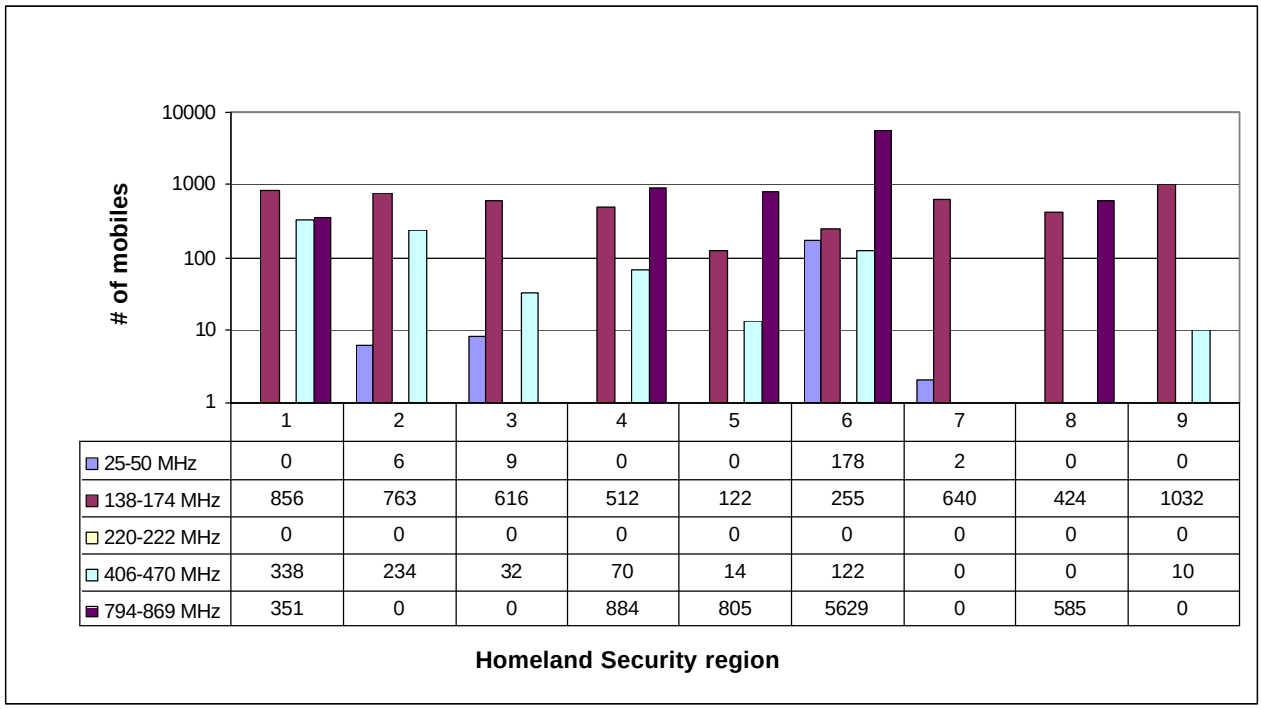
Mobiles	Homeland Security region									
	1	2	3	4	5	6	7	8	9	TOTAL
25-50 MHz	0	6	9	0	0	178	2	0	0	194
138-174 MHz	856	763	616	512	122	255	640	424	1032	5218
220-222 MHz	0	0	0	0	0	0	0	0	0	0
406-470 MHz	338	234	32	70	14	122	0	0	10	820
794-869 MHz	351	0	0	884	805	5629	0	585	0	8254
P25 digital	14	38	111	20	734	51	11	74	0	1053
P25 capable/compatible	163	43	147	53	0	68	41	132	20	666
Digital, not P25	76	32	25	0	0	15	21	98	32	299
Narrowband - not P25	181	2508	164	0	93	420	211	98	729	4403
Anolog only	860	864	433	1406	204	6088	596	763	941	12154
Trunked	304	0	159	908	805	5543	0	657	1	8377
Conventional	793	891	545	496	151	563	620	808	929	5796

Table 5 - Mobile radios reported by Homeland Security regions

Mobiles	State agency							
	EMD	DFW	WSP	DOC	DNR	DOT	DOH	TOTAL
25-50 MHz	54	0	0	0	0	0	0	54
138-174 MHz	55	500	2040	10	1012	0	0	3617
220-222 MHz	0	0	0	0	0	0	0	0
406-470 MHz	6	0	0	0	0	0	0	6
794-869 MHz	10	0	0	185	0	4500	0	4695
P25 digital	0	0	1014	6	0	0	0	1020
P25 capable/compatible	0	225	0	0	1012	0	0	1237
Not P25 digital/capable	0	0	0	0	0	0	0	0
Narrowband - not P25	2	140	0	195	0	0	0	337
Anolog only	125	200	1037	146	0	4500	0	6008
Trunked	10	0	0	18	0	4275	0	4303
Conventional	125	500	2040	146	1012	225	0	4048

Table 6 - Mobile radios reported by state agencies

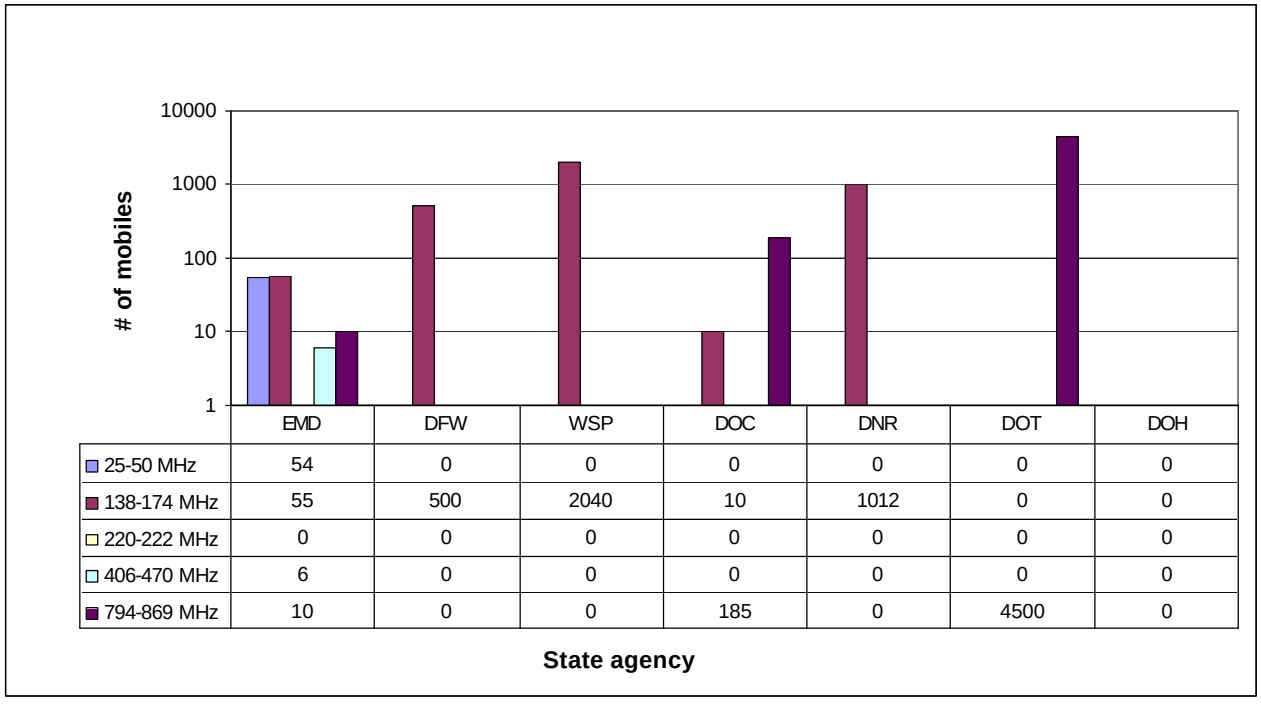
2.2.6 Mobiles by frequency band



	1	2	3	4	5	6	7	8	9
25-50 MHz	0	6	9	0	0	178	2	0	0
138-174 MHz	856	763	616	512	122	255	640	424	1032
220-222 MHz	0	0	0	0	0	0	0	0	0
406-470 MHz	338	234	32	70	14	122	0	0	10
794-869 MHz	351	0	0	884	805	5629	0	585	0

Homeland Security region

Figure 13 - Mobiles by frequency band reported by Homeland Security regions



	EMD	DFW	WSP	DOC	DNR	DOT	DOH
25-50 MHz	54	0	0	0	0	0	0
138-174 MHz	55	500	2040	10	1012	0	0
220-222 MHz	0	0	0	0	0	0	0
406-470 MHz	6	0	0	0	0	0	0
794-869 MHz	10	0	0	185	0	4500	0

State agency

Figure 14 - Mobiles by frequency band reported by state agencies

2.2.7 Mobile attributes

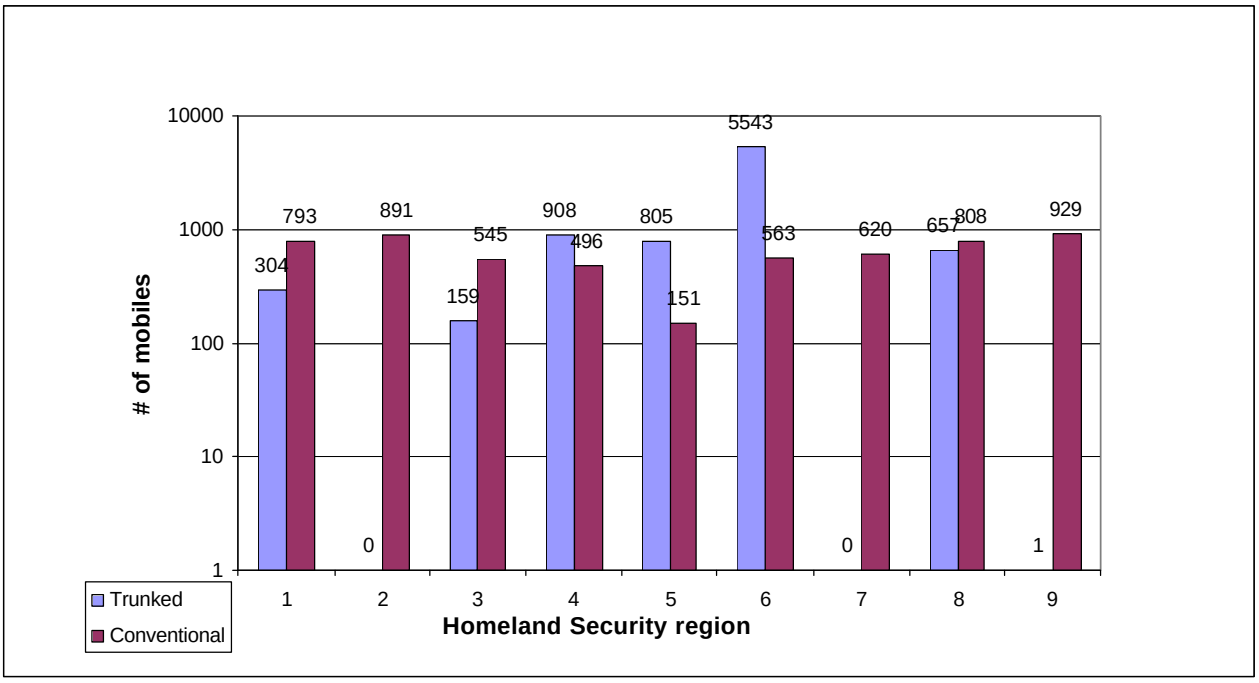


Figure 15 - Conventional/trunked mobiles reported by Homeland Security regions

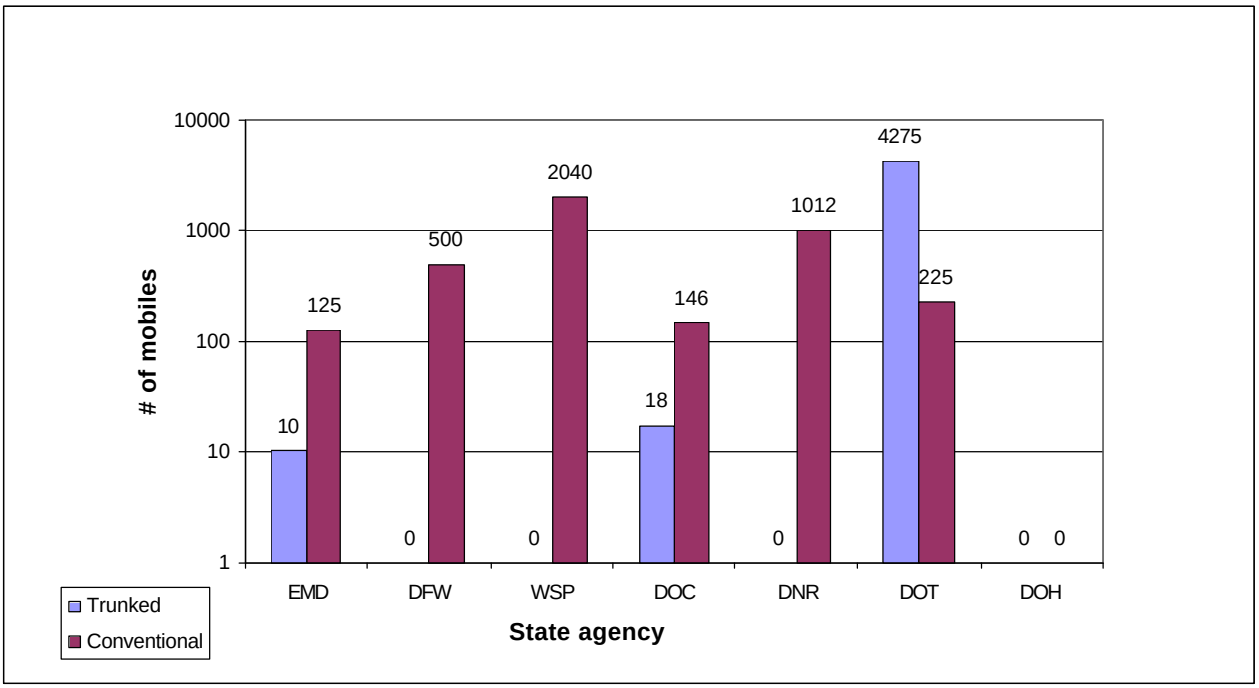


Figure 16 - Conventional/trunked mobiles reported by state agencies

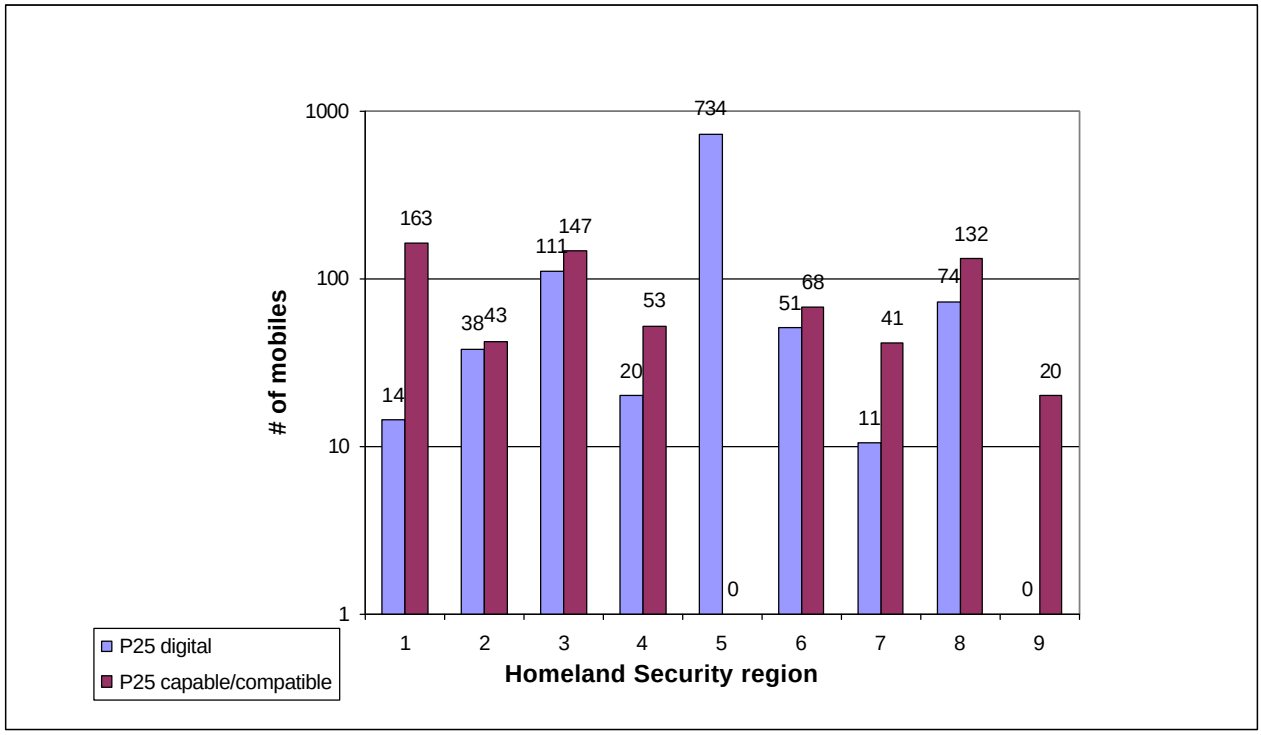


Figure 17 - P25 protocol mobiles reported by Homeland Security regions

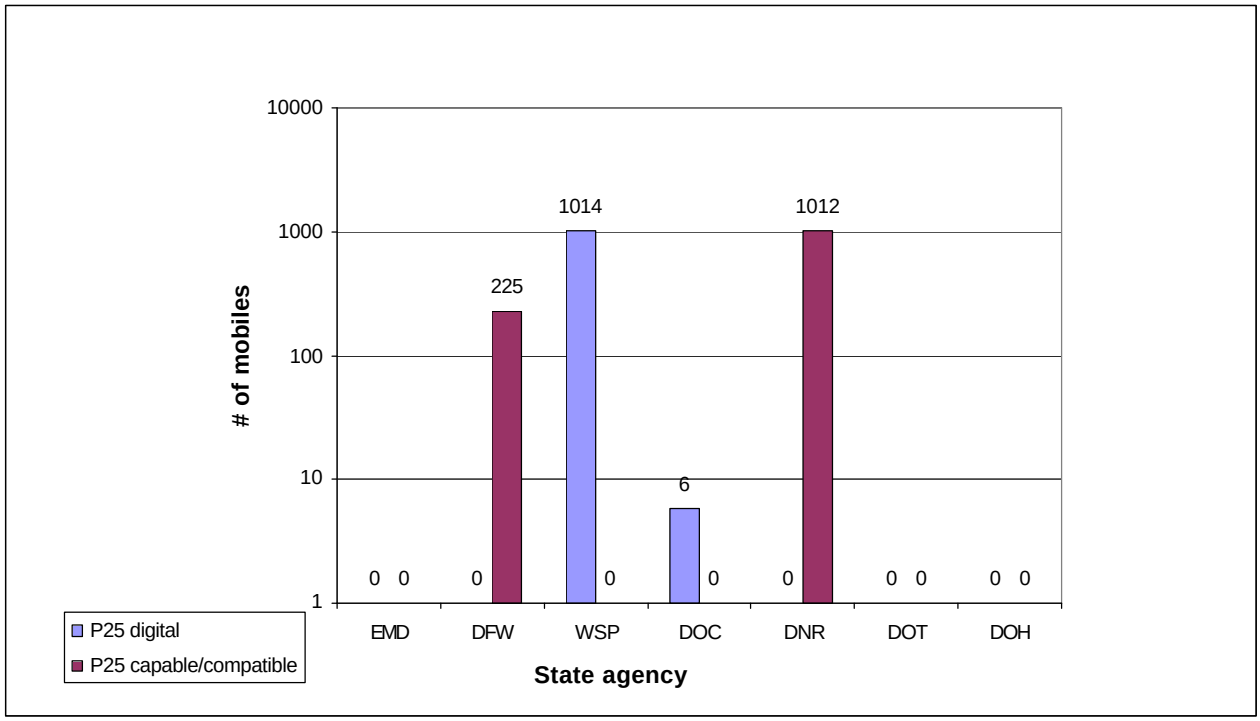


Figure 18 - P25 protocol mobiles reported by state agencies

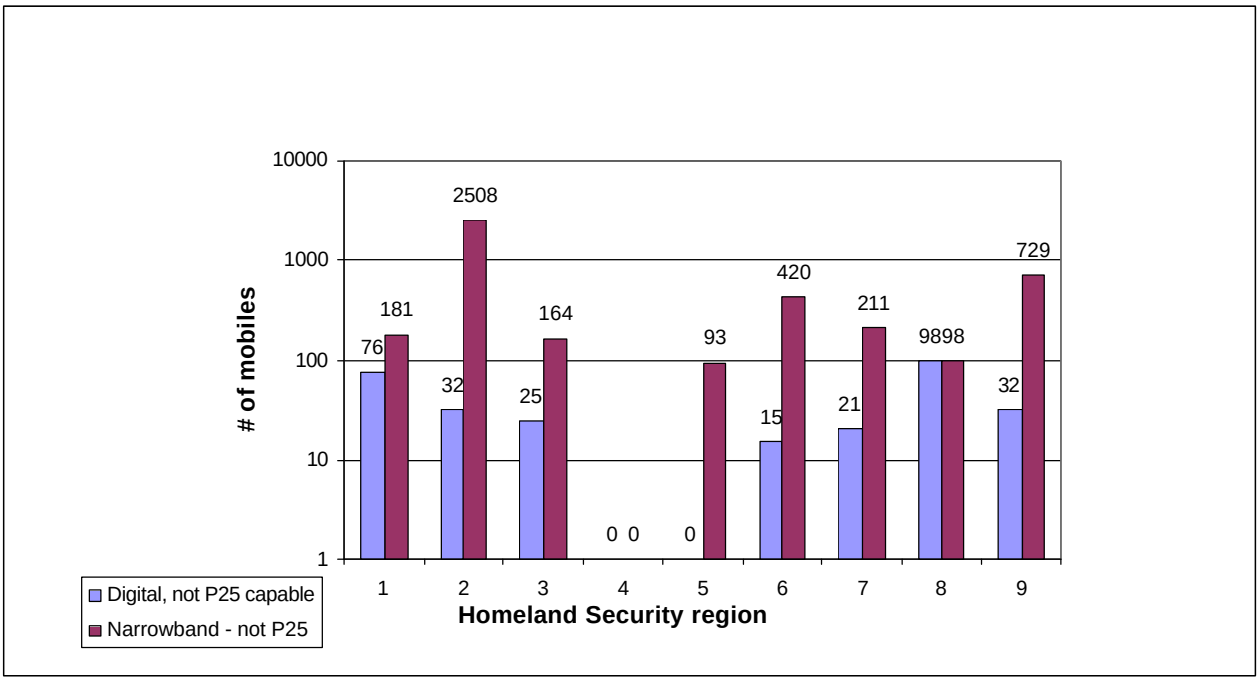


Figure 19 - Mobiles, digital and/or narrowband - not P25 capable - reported by Homeland Security regions

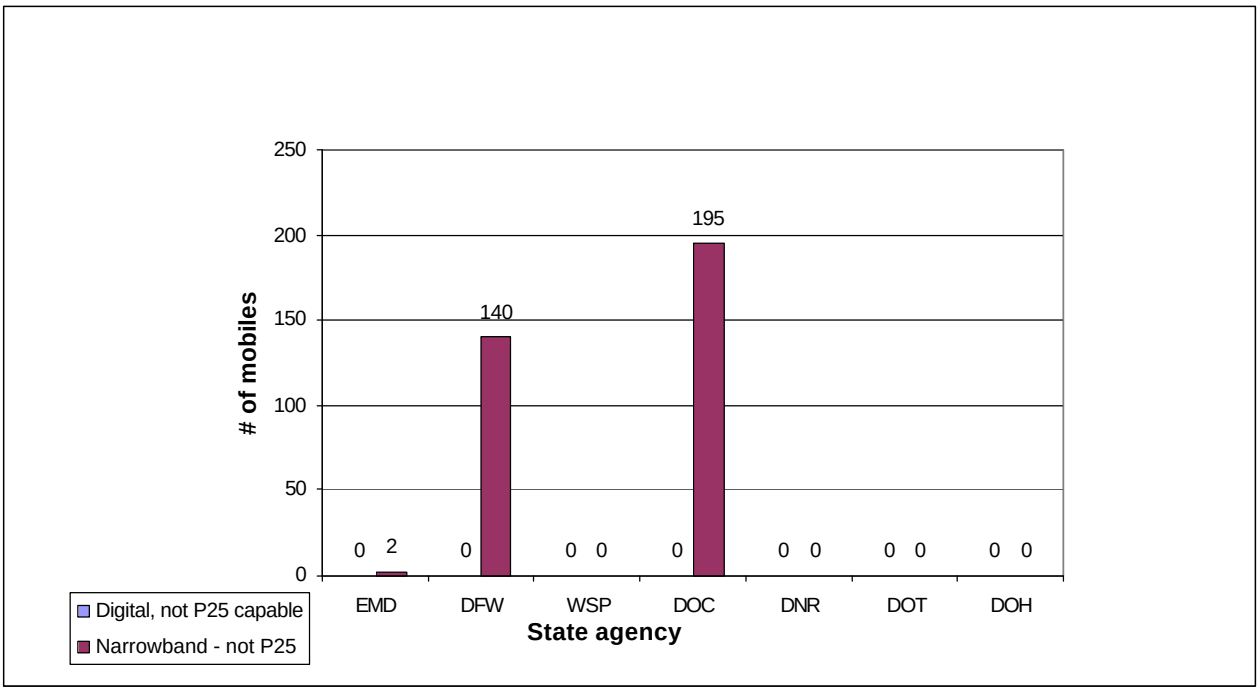


Figure 20 - Mobiles, digital and/or narrowband - not P25 capable - reported by state agencies

2.2.8 Base stations/repeaters

Table 7 and Table 8 show the number of base stations/repeaters reported in the survey by Homeland Security region and state agencies respectively.

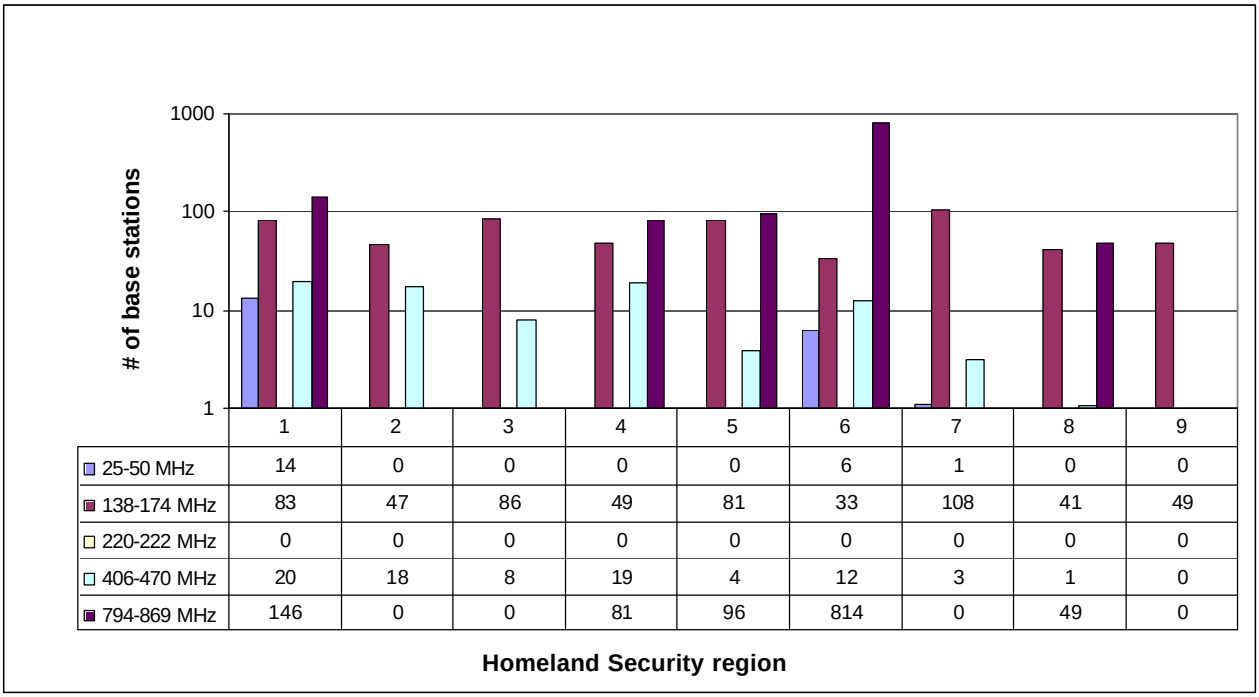
Base stations	Homeland Security region									
	1	2	3	4	5	6	7	8	9	TOTAL
25-50 MHz	14	0	0	0	0	6	1	0	0	21
138-174 MHz	83	47	86	49	81	33	108	41	49	577
220-222 MHz	0	0	0	0	0	0	0	0	0	0
406-470 MHz	20	18	8	19	4	12	3	1	0	85
794-869 MHz	146	0	0	81	96	814	0	49	0	1186
P25 digital	2	0	1	6	98	14	0	8	0	128
P25 capable	28	0	1	19	38	16	2	15	4	123
Not P25 digital/capable	149	0	1	0	0	0	0	1	1	152
Narrowband - not P25	173	7	2	20	75	17	31	8	12	344
Analog only	110	61	92	143	81	775	107	75	38	1481
Trunked	142	0	0	77	90	811	0	57	3	1180
Conventional	102	62	90	69	90	52	112	27	34	637
Base station configuration	76	27	72	75	16	674	55	17	19	1030
Repeater configuration	162	38	18	69	172	183	57	72	25	1116

Table 7 - Base stations - Homeland Security regions

Base stations	State agency							
	DNR	EMD	DOC	WSP	DFW	DOT	DOH	TOTAL
25-50 MHz	0	1	0	0	0	0	0	1
138-174 MHz	126	1	20	215	15	0	0	377
220-222 MHz	0	0	0	0	0	0	0	0
406-470 MHz	0	0	0	0	0	0	0	0
794-869 MHz	0	0	112	0	0	350	1	463
P25 digital	0	0	0	0	0	0	0	0
P25 capable	126	0	49	215	1	0	0	391
Not P25 digital/capable	0	0	0	0	0	0	0	0
Narrowband - not P25	0	0	132	0	0	0	0	132
Analog only	0	0	132	0	15	350	0	497
Trunked	0	0	15	0	0	347	0	361
Conventional	126	0	117	215	15	4	0	477
Base station configuration	20	0	49	189	14	4	0	276
Repeater configuration	106	0	83	26	1	347	0	562

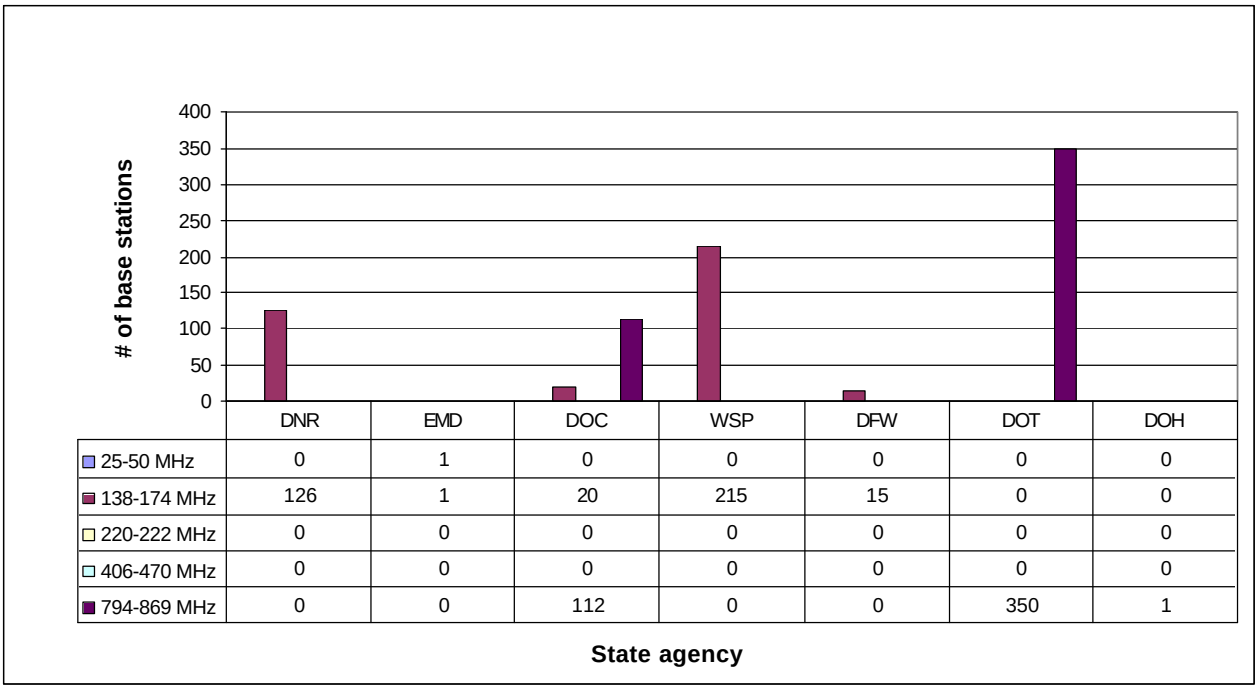
Table 8 - Base stations - state agencies

2.2.9 Base stations by frequency band



	1	2	3	4	5	6	7	8	9
25-50 MHz	14	0	0	0	0	6	1	0	0
138-174 MHz	83	47	86	49	81	33	108	41	49
220-222 MHz	0	0	0	0	0	0	0	0	0
406-470 MHz	20	18	8	19	4	12	3	1	0
794-869 MHz	146	0	0	81	96	814	0	49	0

Figure 21 - Base stations by frequency band reported by Homeland Security regions



	DNR	EMD	DOC	WSP	DFW	DOT	DOH
25-50 MHz	0	1	0	0	0	0	0
138-174 MHz	126	1	20	215	15	0	0
220-222 MHz	0	0	0	0	0	0	0
406-470 MHz	0	0	0	0	0	0	0
794-869 MHz	0	0	112	0	0	350	1

Figure 22 - Base stations by frequency band reported by state agencies

2.2.10 Base station attributes

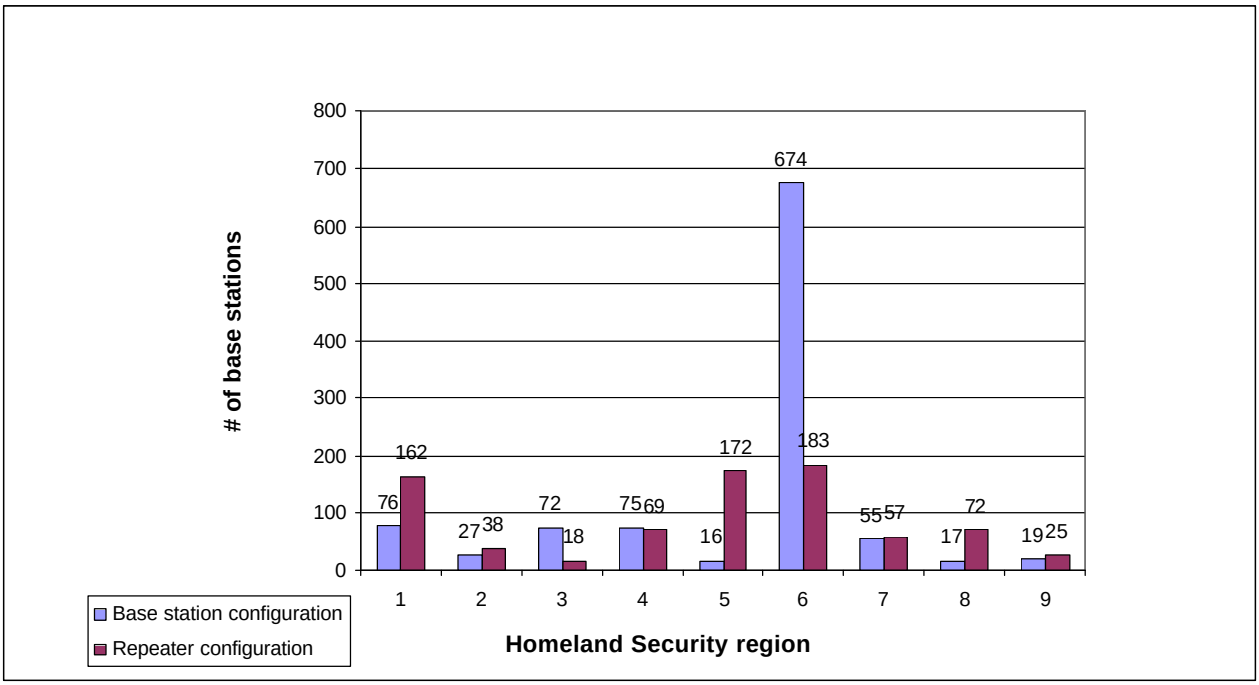


Figure 23 - Base station configuration reported by Homeland Security regions

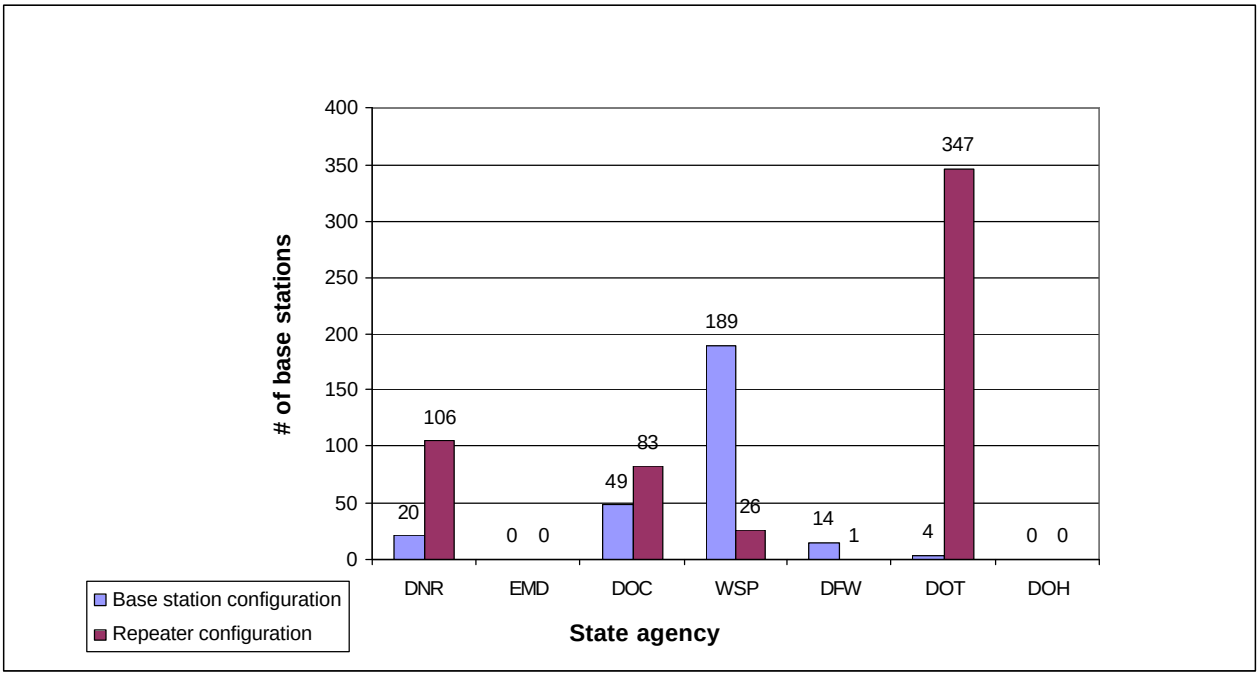


Figure 24 - Base station configuration reported by state agencies

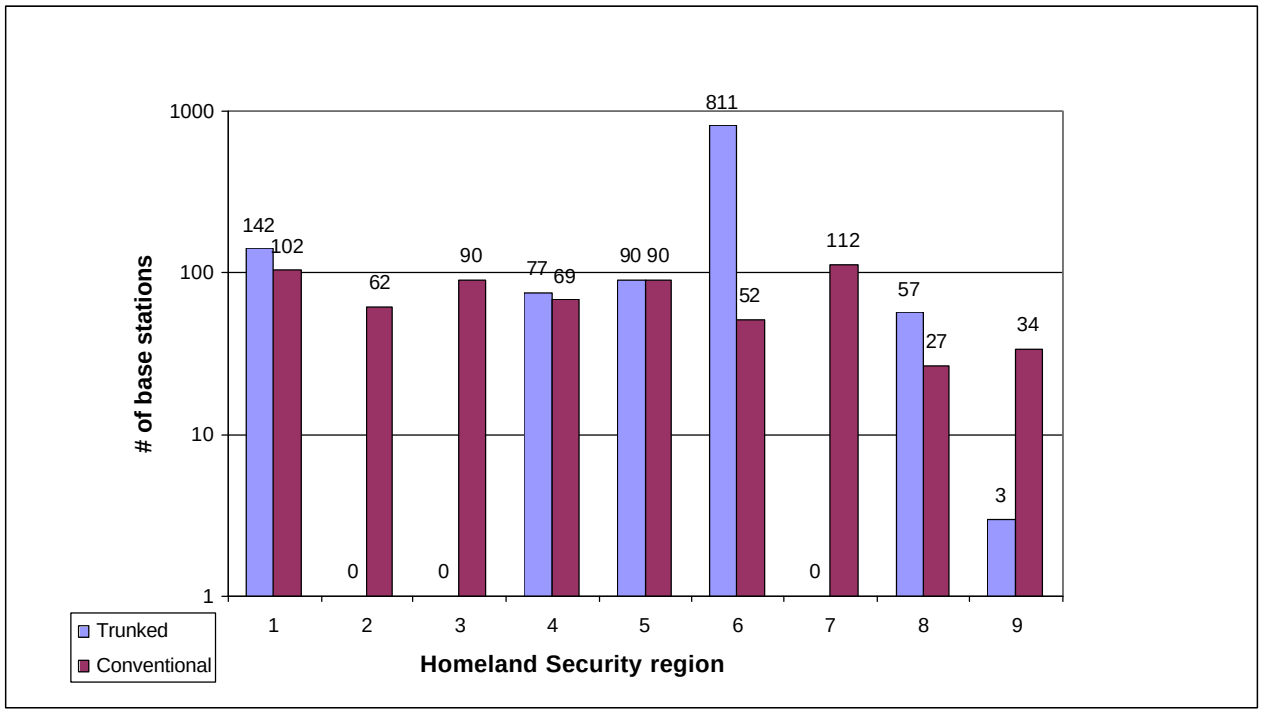


Figure 25 - Conventional/trunked base stations reported by Homeland Security regions

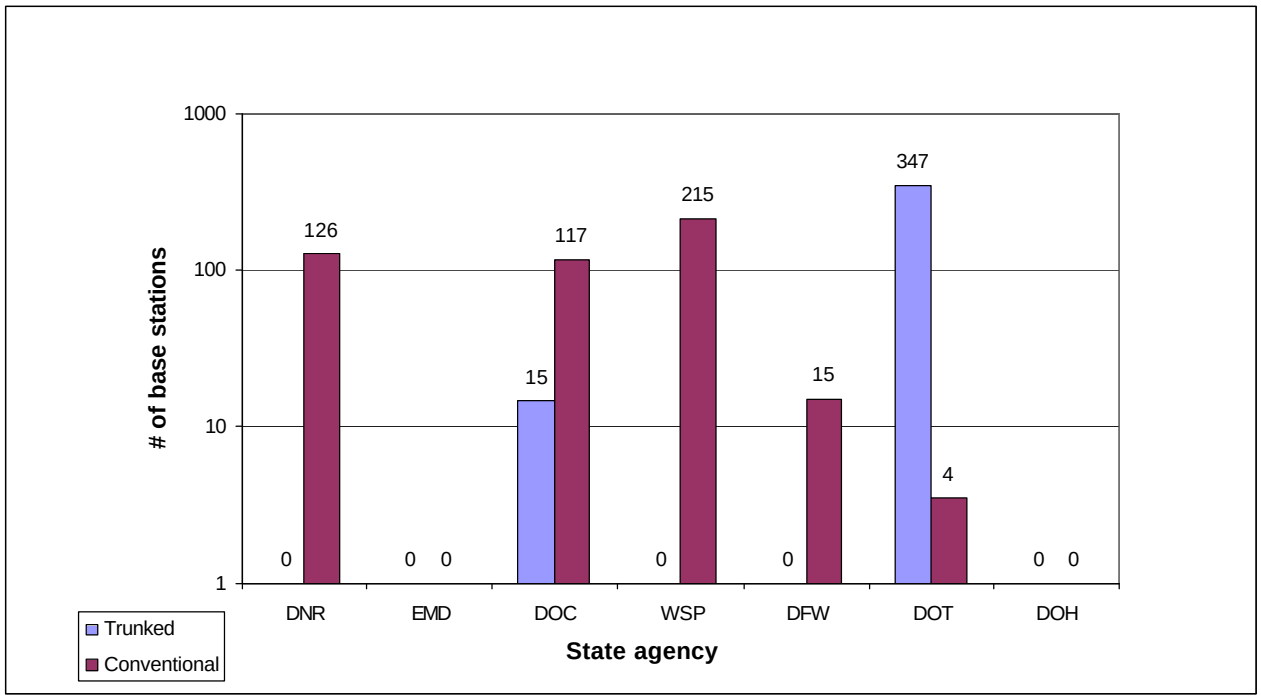


Figure 26 - Conventional/trunked base stations reported by state agencies

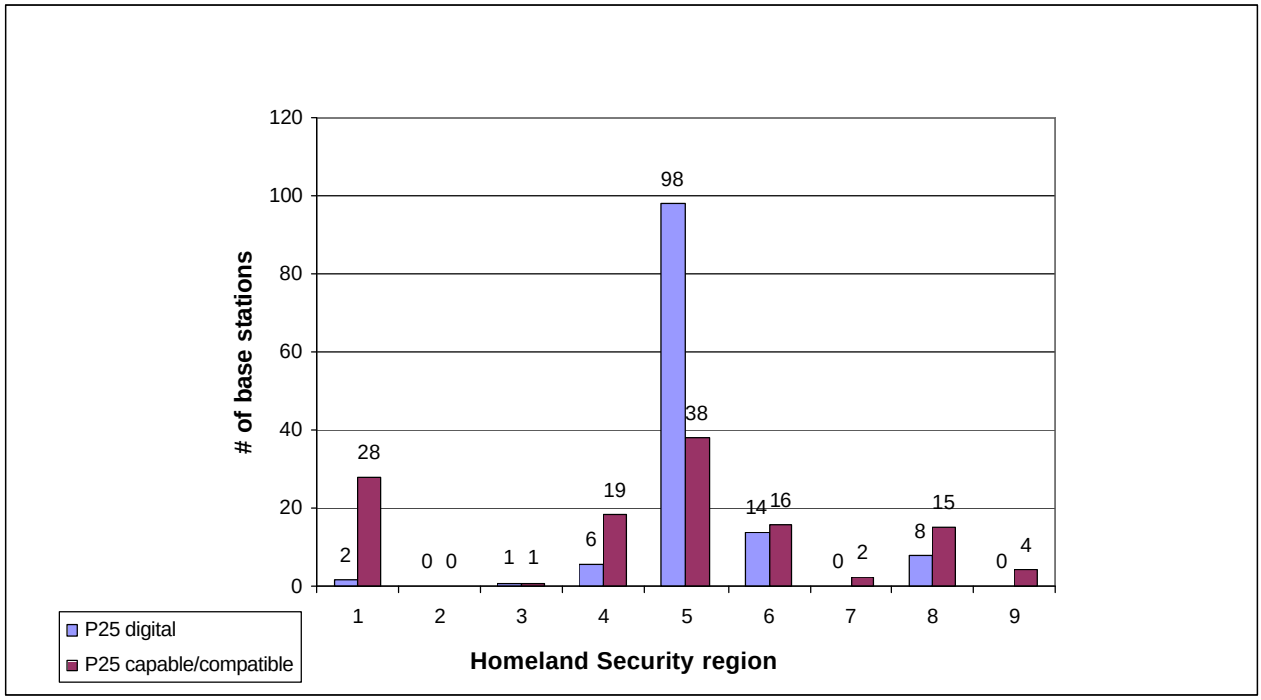


Figure 27 - P25 protocol base stations reported by Homeland Security regions

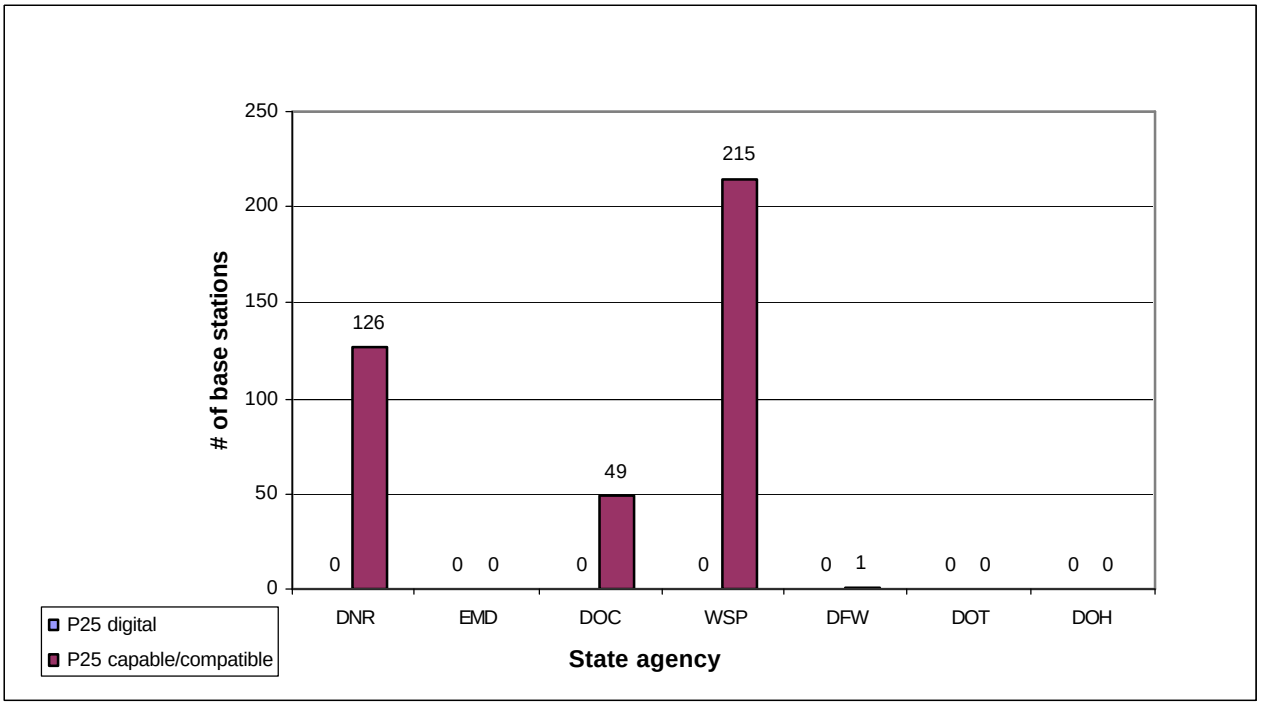


Figure 28 - P25 protocol base stations reported by state agencies

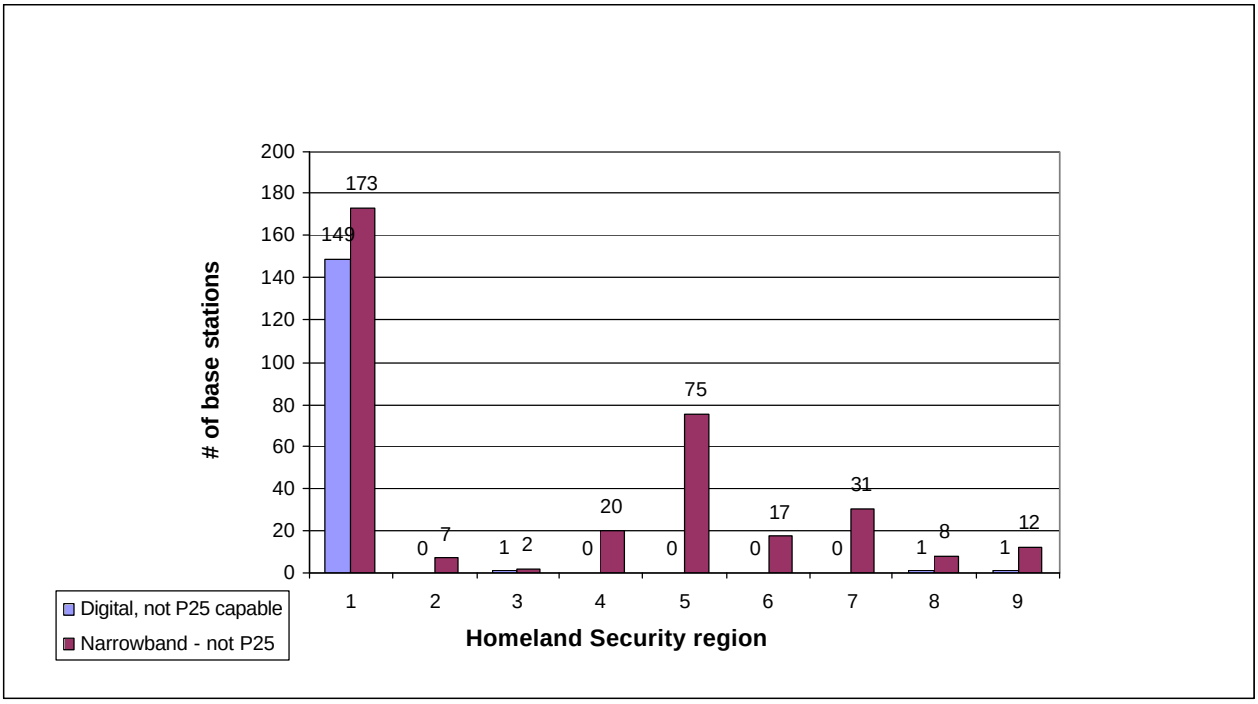


Figure 29 - Base stations, digital and/or narrowband - not P25 capable - reported by Homeland Security regions

Base stations, digital and/or narrowband – not P25 capable – reported by state agencies (not charted) were reported only by the Washington State Patrol (WSP). WSP reported 132 narrowband base stations. None of the state agencies reported digital base stations – not P25 capable.

2.3 Technical - infrastructure

2.3.1 Introduction

Data from the tower/shelter section of the study came from 315 responder records in which participants answered at least one of the questions in the section. The distribution of the responders using the “agency mission” category is shown in Table 9.

Reporting agency	Responses
Fire - city fire department	5
Fire - county fire department/district	5
Fire – fire protection district	1
Fire - industrial fire district	2
Law enforcement - police department	87
Law enforcement - sheriff's office	16
Law enforcement - tribal police department	1
Other	20
Other - emergency management center	18
Other - PSAP	99
Other - public services	31
Other - public utilities	2
Other - transportation	28

Table 9 - Source of data for towers/shelters

2.3.2 Tower utilization

A total of 315 towers were reported by Homeland Security regions and state agencies. This total consists of 170 towers utilized in regions 1-9, plus an additional 145 towers for state agencies. Towers are reported by region and by state agency and are shown in Figure 30 and Figure 31 respectively.

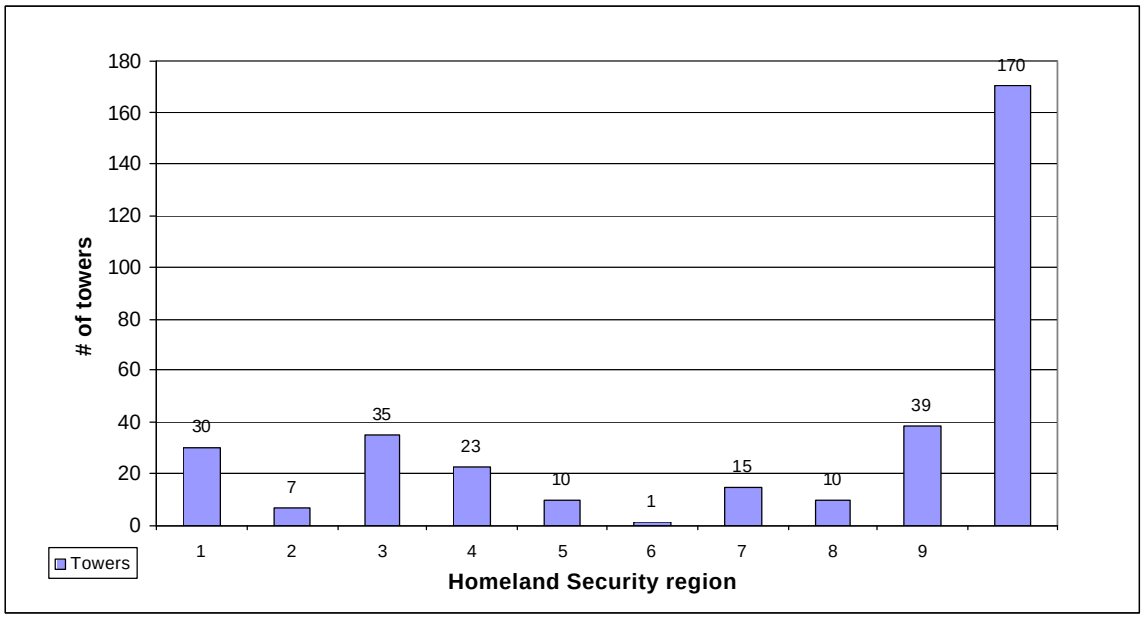


Figure 30 - Towers reported by Homeland Security region

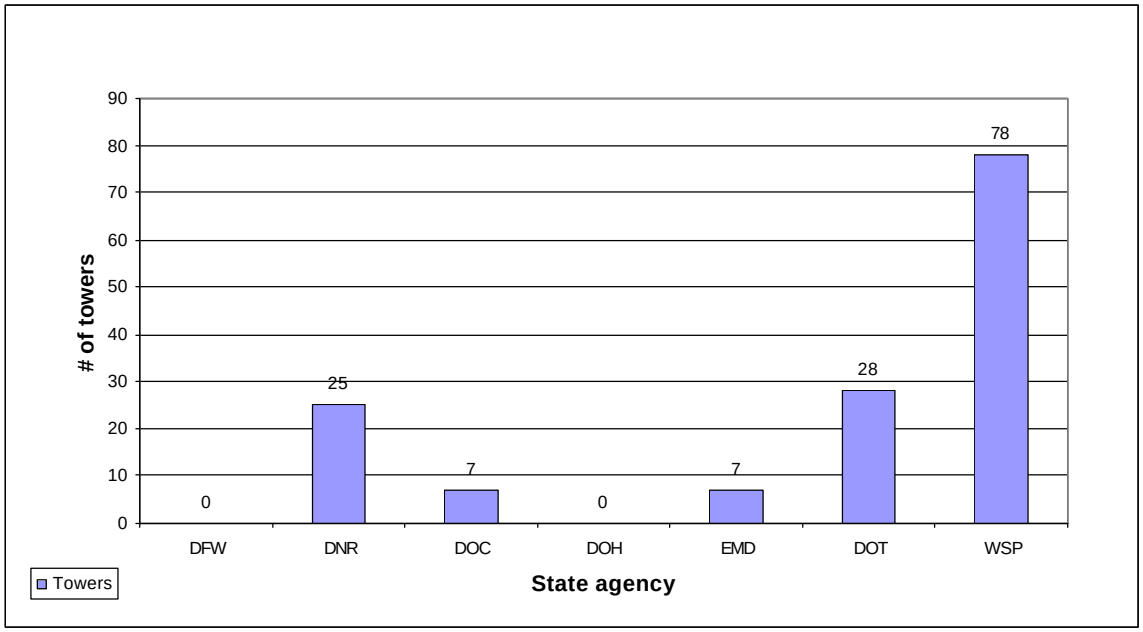


Figure 31 - Towers reported by state agency

2.3.3 Tower ownership

Figure 32 and Figure 33 show the breakdown of leased, owned and not reported (N/R) tower facilities.

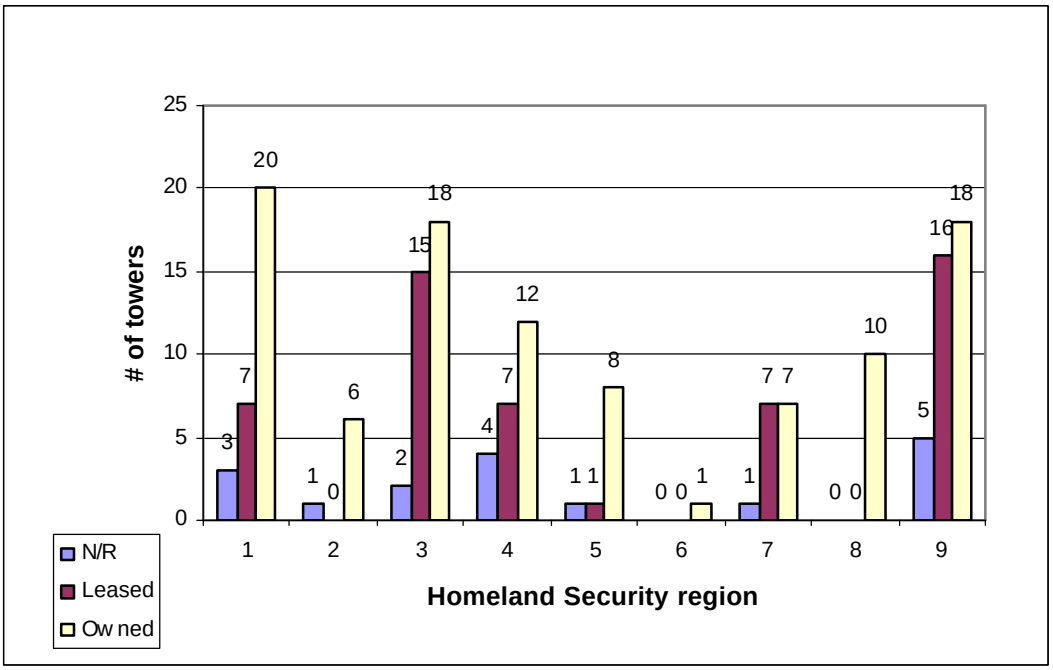


Figure 32 - Tower ownership reported by Homeland Security regions

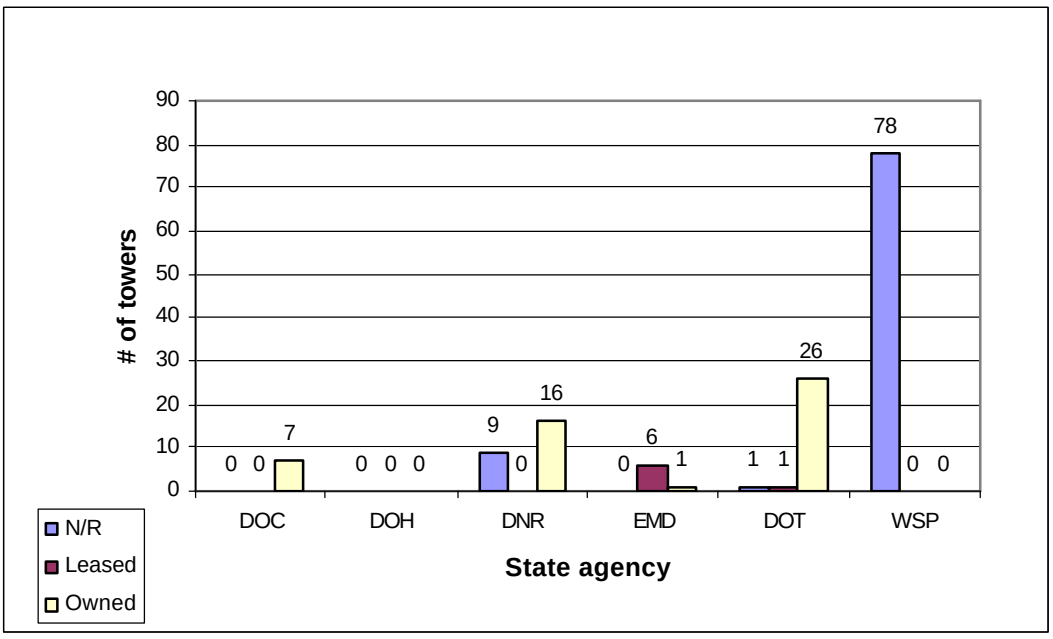
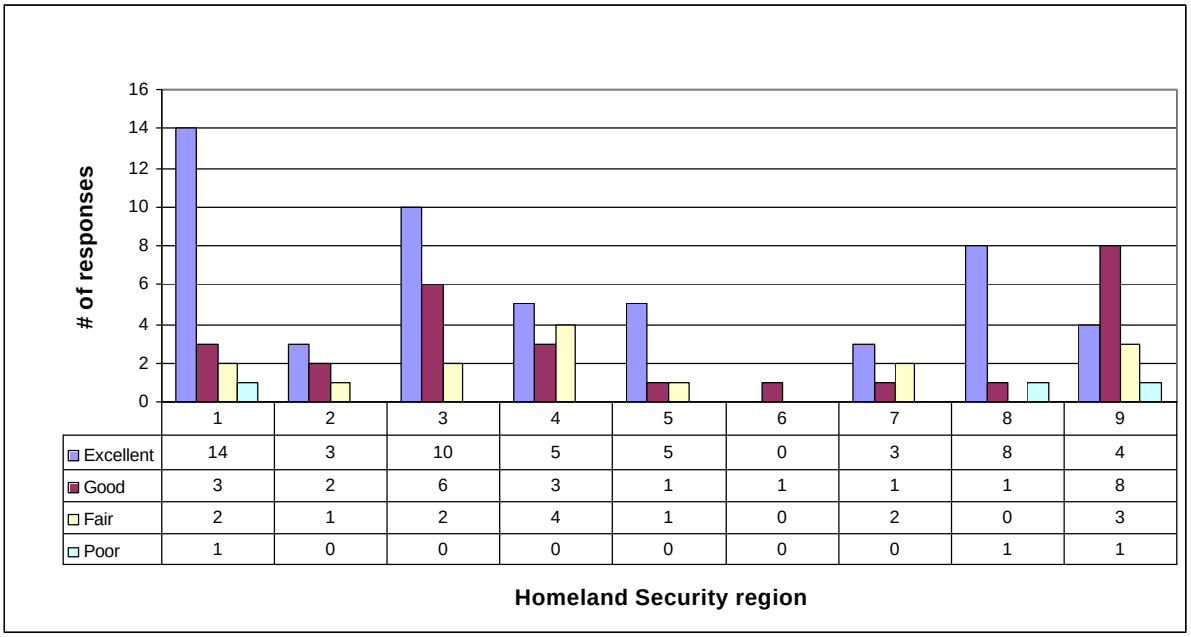


Figure 33 - Tower ownership reported by state agencies

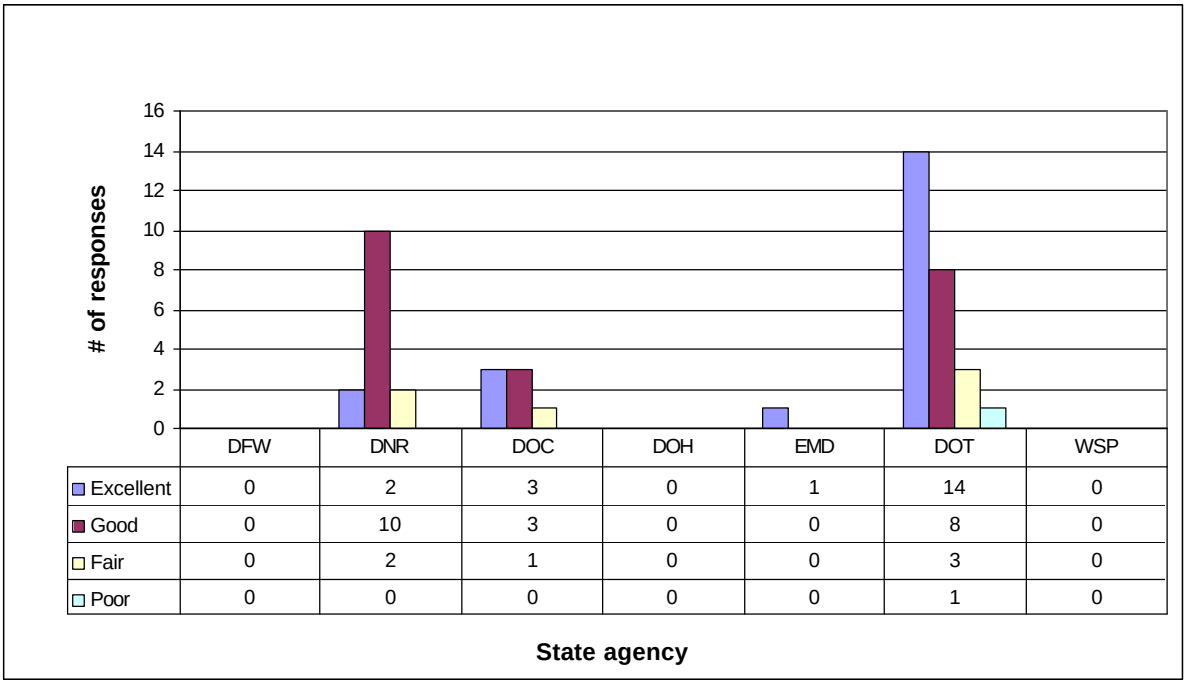
2.3.4 Tower condition

The remainder of the report uses the owned facilities data only. Regions and state agencies report that the majority of their tower and shelter facilities are in excellent to good condition. Figure 34 and Figure 35 identify tower and shelter facility conditions by Homeland Security region and state agency respectively.



	1	2	3	4	5	6	7	8	9
Excellent	14	3	10	5	5	0	3	8	4
Good	3	2	6	3	1	1	1	1	8
Fair	2	1	2	4	1	0	2	0	3
Poor	1	0	0	0	0	0	0	1	1

Figure 34 - Tower condition reported by Homeland Security regions



	DFW	DNR	DOC	DOH	EMD	DOT	WSP
Excellent	0	2	3	0	1	14	0
Good	0	10	3	0	0	8	0
Fair	0	2	1	0	0	3	0
Poor	0	0	0	0	0	1	0

Figure 35 - Tower condition reported by state agencies

2.3.5 Heating, ventilation and air conditioning (HVAC)

Information regarding HVAC systems for existing shelters is shown in Figure 36 and Figure 37 as reported by Homeland Security region and state agency respectively.

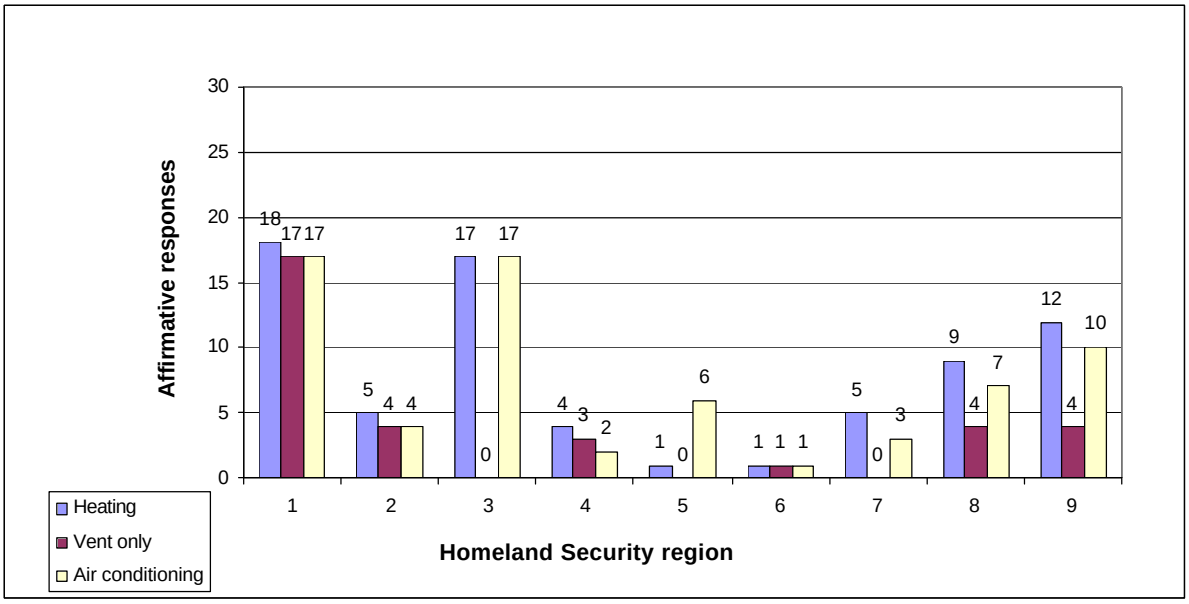


Figure 36 - Shelter HVAC systems reported by Homeland Security regions

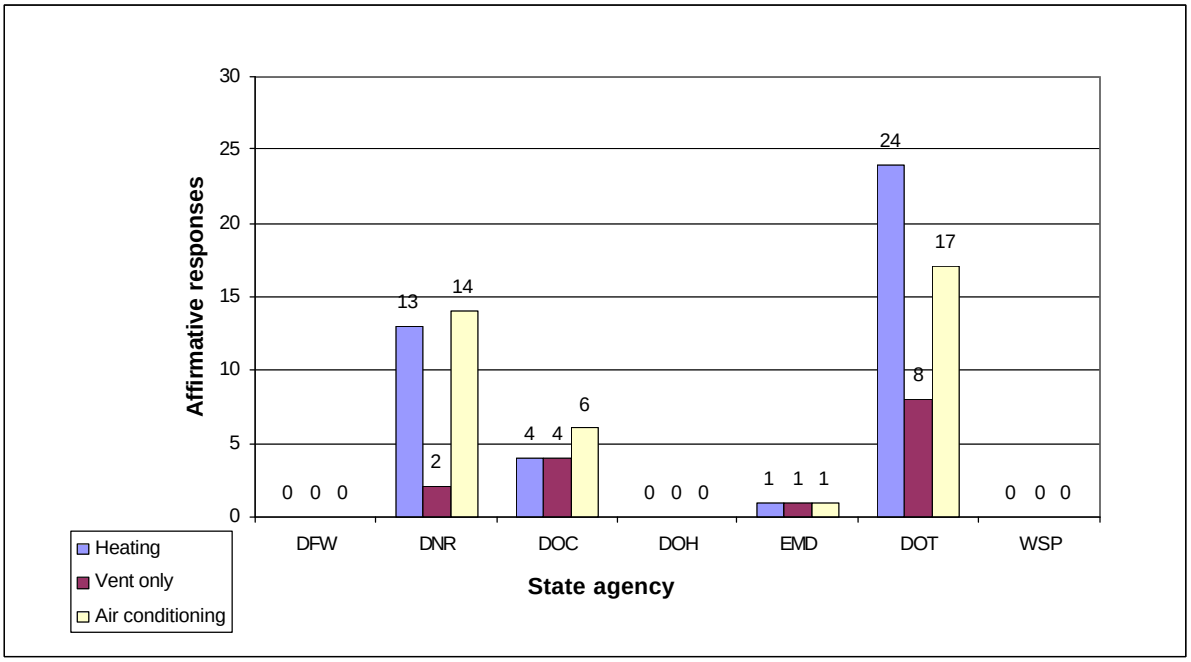


Figure 37 - Shelter HVAC systems reported by state agencies

2.3.6 Site expansion inhibitors

Approximately 55 percent of responders indicate that current facilities have little to no room for expansion. The major inhibitors, as reported by Homeland Security region and state agencies, are shown in Figure 38 and Figure 39 respectively.

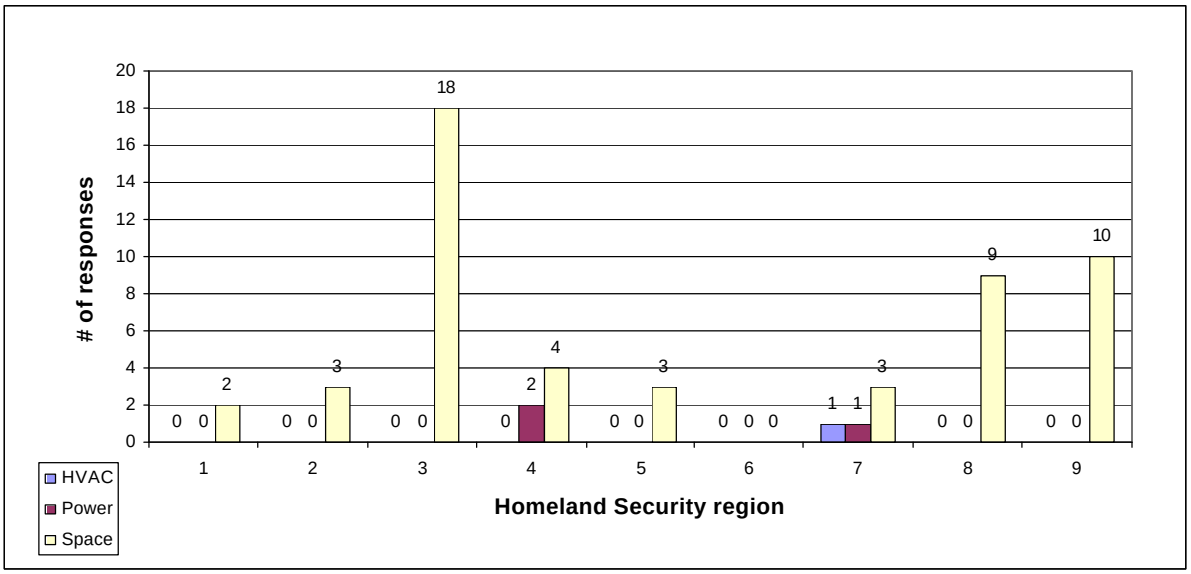


Figure 38 - Expansion inhibitors reported by Homeland Security regions

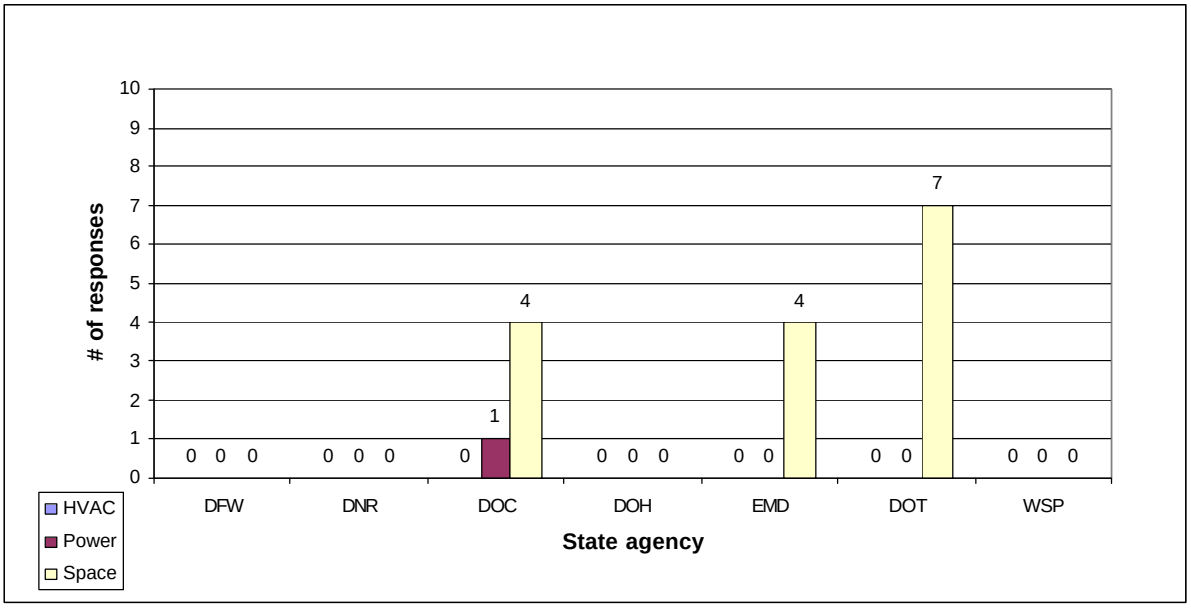
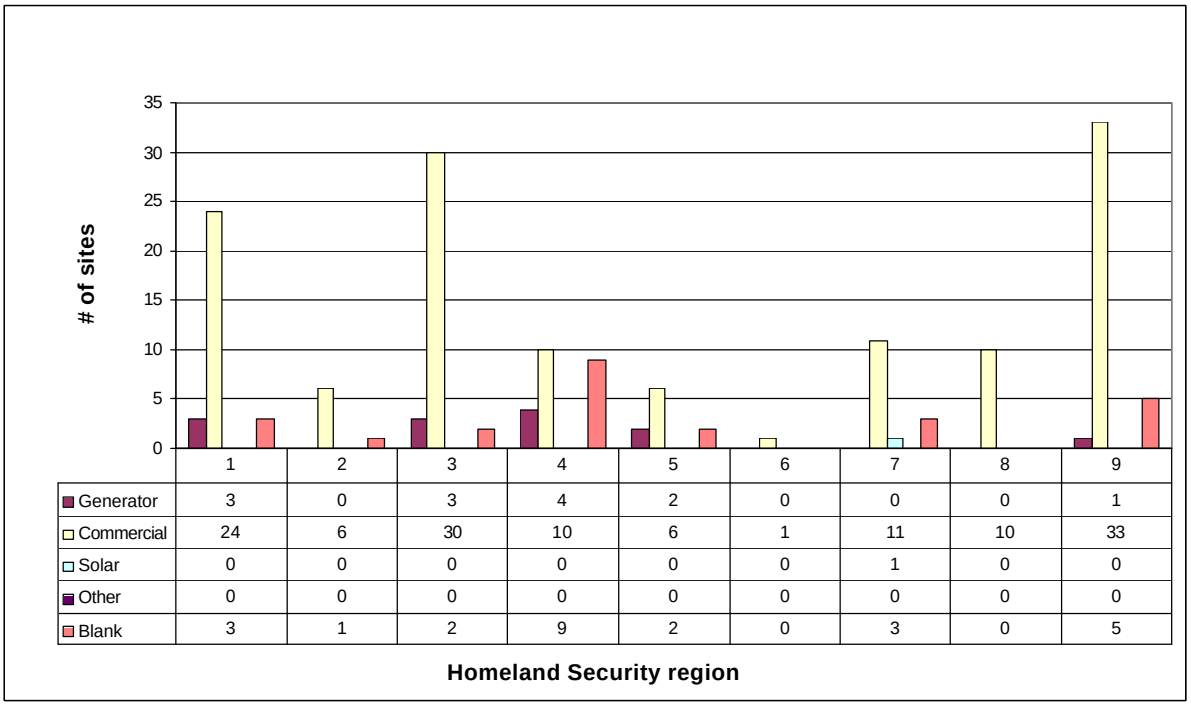


Figure 39 - Expansion inhibitors reported by state agencies

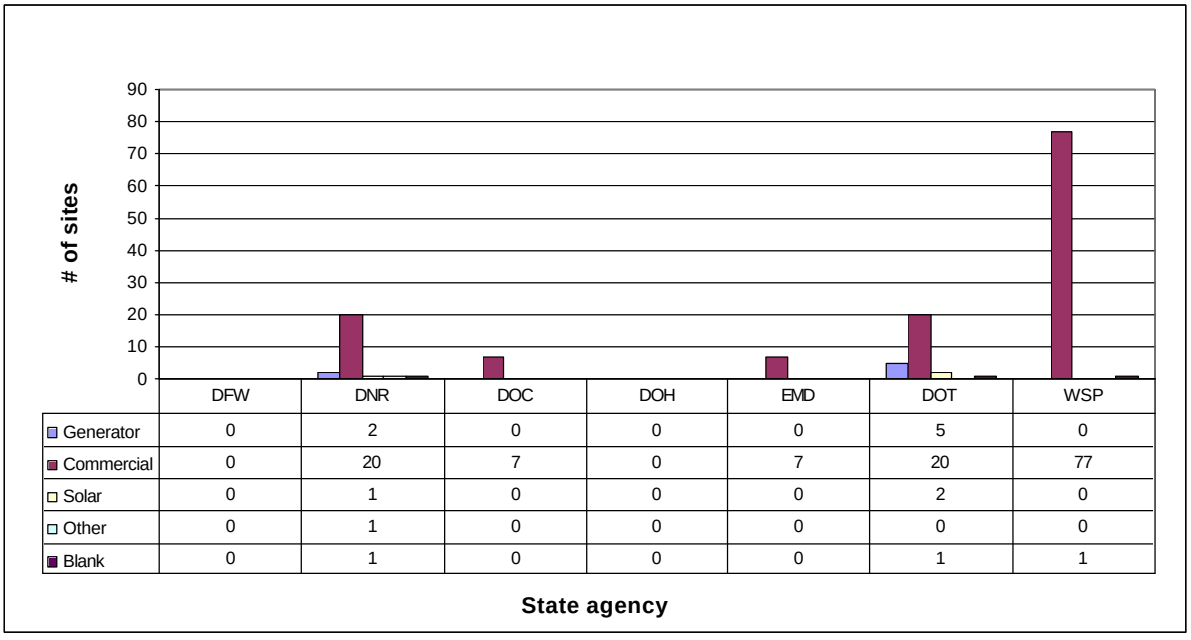
2.3.7 Primary power

The primary power system for the majority of facilities is commercial power. Figure 40 and Figure 41 display the power systems employed by Homeland Security region and state agencies at existing sites.



	1	2	3	4	5	6	7	8	9
Generator	3	0	3	4	2	0	0	0	1
Commercial	24	6	30	10	6	1	11	10	33
Solar	0	0	0	0	0	0	1	0	0
Other	0	0	0	0	0	0	0	0	0
Blank	3	1	2	9	2	0	3	0	5

Figure 40 - Primary power reported by Homeland Security regions

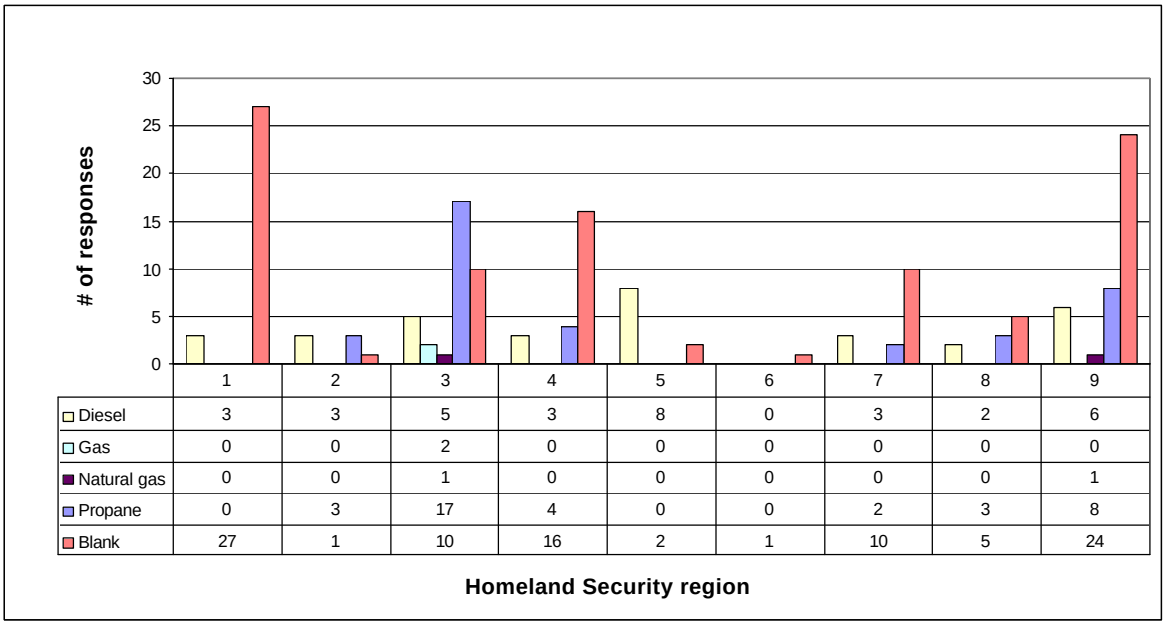


	DFW	DNR	DOC	DOH	EMD	DOT	WSP
Generator	0	2	0	0	0	5	0
Commercial	0	20	7	0	7	20	77
Solar	0	1	0	0	0	2	0
Other	0	1	0	0	0	0	0
Blank	0	1	0	0	0	1	1

Figure 41 - Primary power reported by state agencies

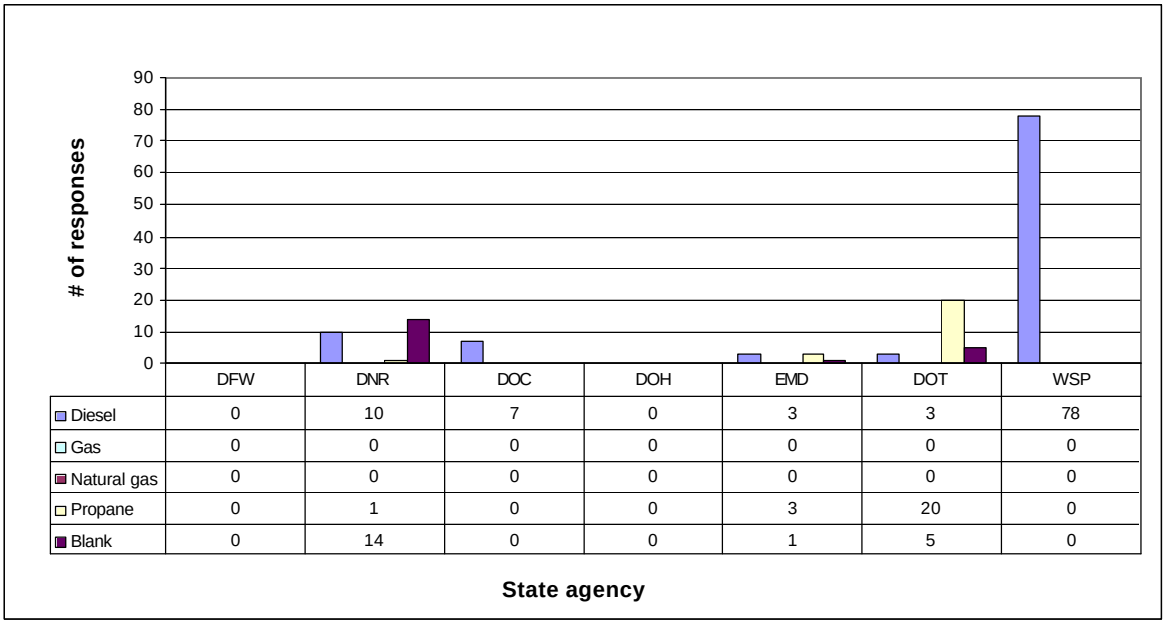
2.3.8 Power backup

Backup systems commonly consist of generators, for which several fuel types are available. Diesel and propane fuels were the most commonly reported types of fuel used. Figure 42 and Figure 43 show the fuels used by Homeland Security region and state agencies for systems in place.



	1	2	3	4	5	6	7	8	9
Diesel	3	3	5	3	8	0	3	2	6
Gas	0	0	2	0	0	0	0	0	0
Natural gas	0	0	1	0	0	0	0	0	1
Propane	0	3	17	4	0	0	2	3	8
Blank	27	1	10	16	2	1	10	5	24

Figure 42 - Fuel type for backup power reported by Homeland Security regions



	DFW	DNR	DOC	DOH	EMD	DOT	WSP
Diesel	0	10	7	0	3	3	78
Gas	0	0	0	0	0	0	0
Natural gas	0	0	0	0	0	0	0
Propane	0	1	0	0	3	20	0
Blank	0	14	0	0	1	5	0

Figure 43 - Fuel type for backup power reported by state agencies

2.3.9 Power protection

Figure 44 and Figure 45 show the percentage of sites that employ uninterruptible power systems (UPS) and lightning protection technologies.

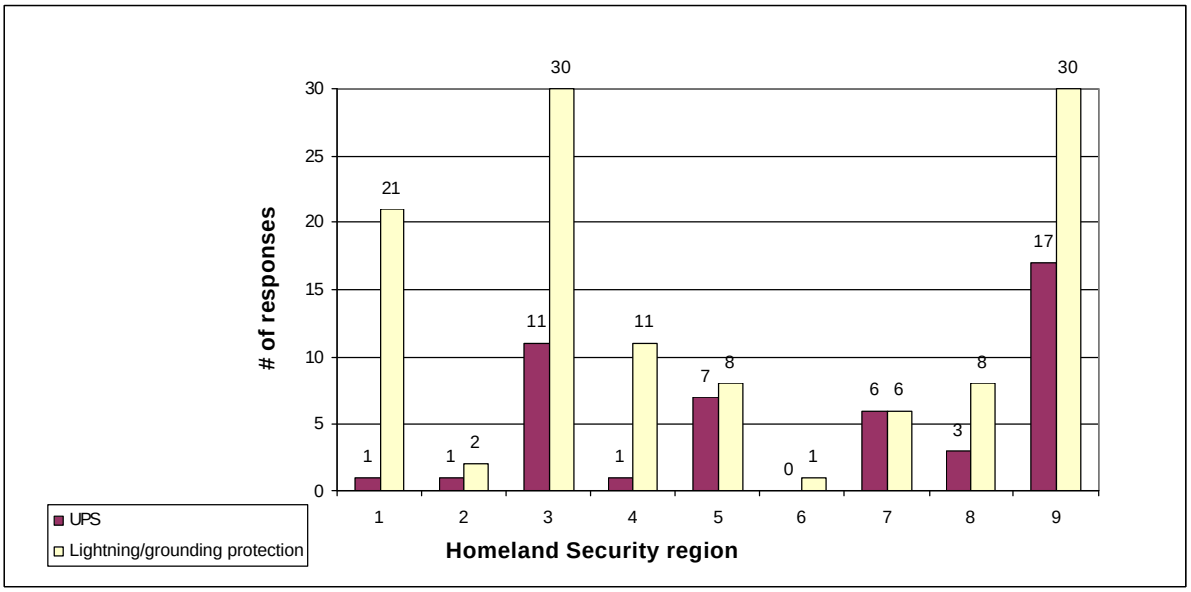


Figure 44 - Power protection systems employed by Homeland Security regions

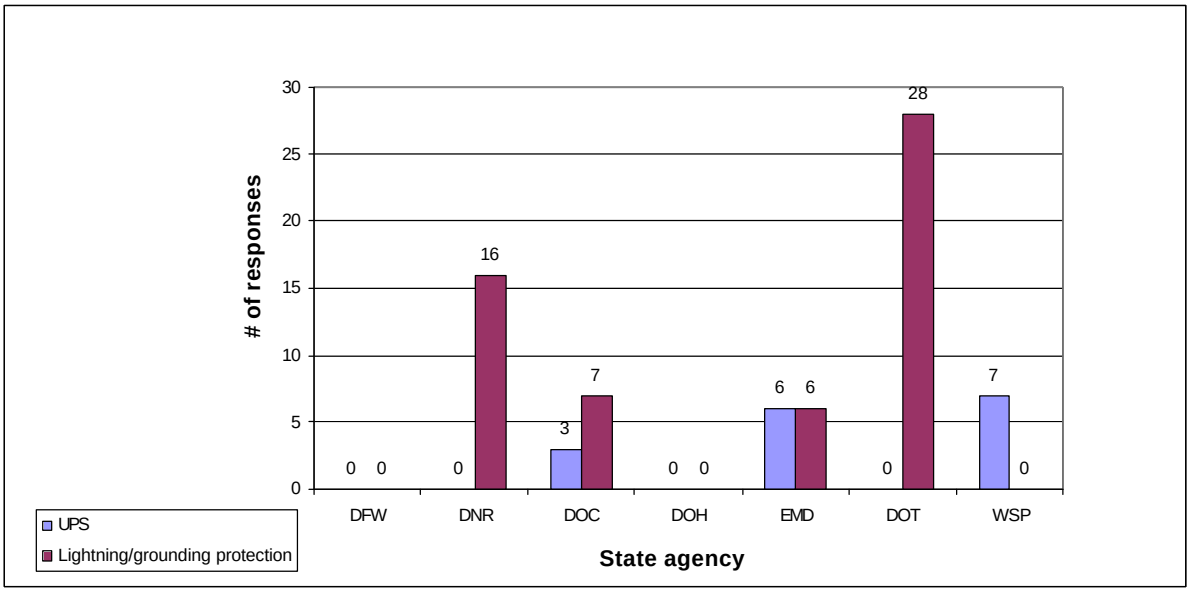


Figure 45 - Power protection systems employed by state agencies

2.3.10 Alarm systems

Figure 46 and Figure 47 show the number of alarms systems and type in use by Homeland Security region and state agencies.

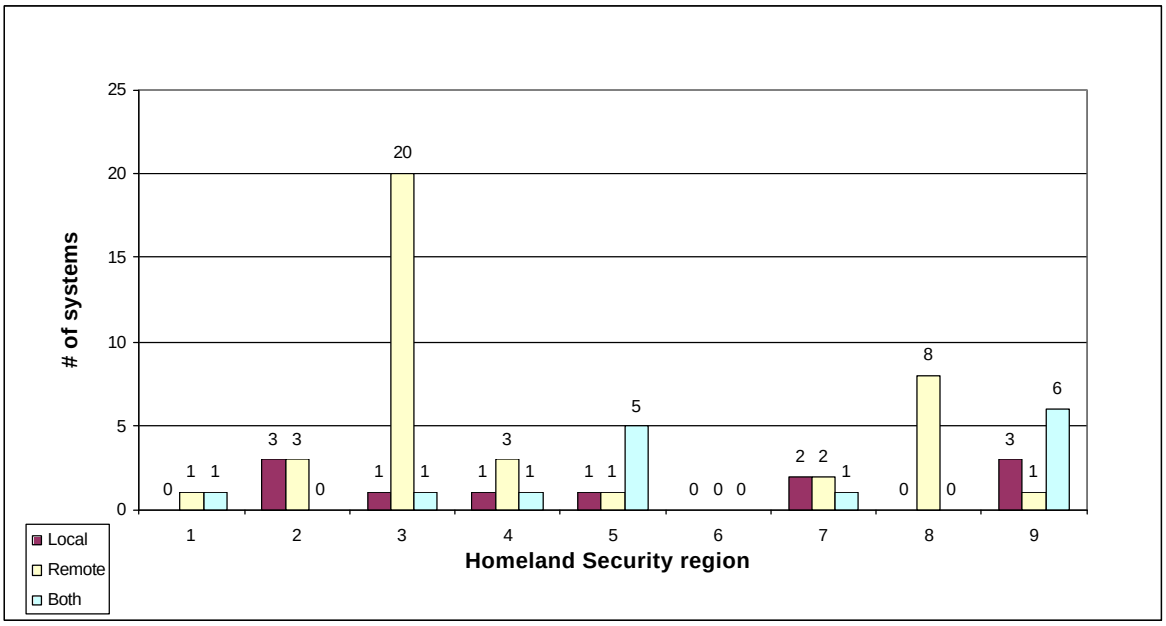
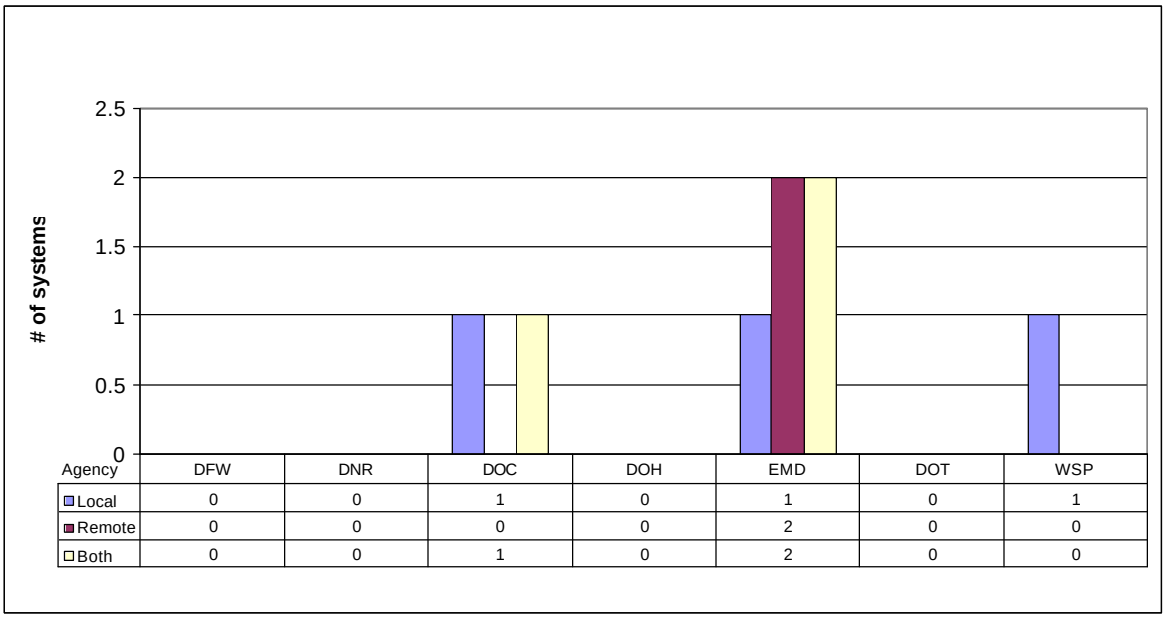


Figure 46 - Alarm systems installed by Homeland Security regions

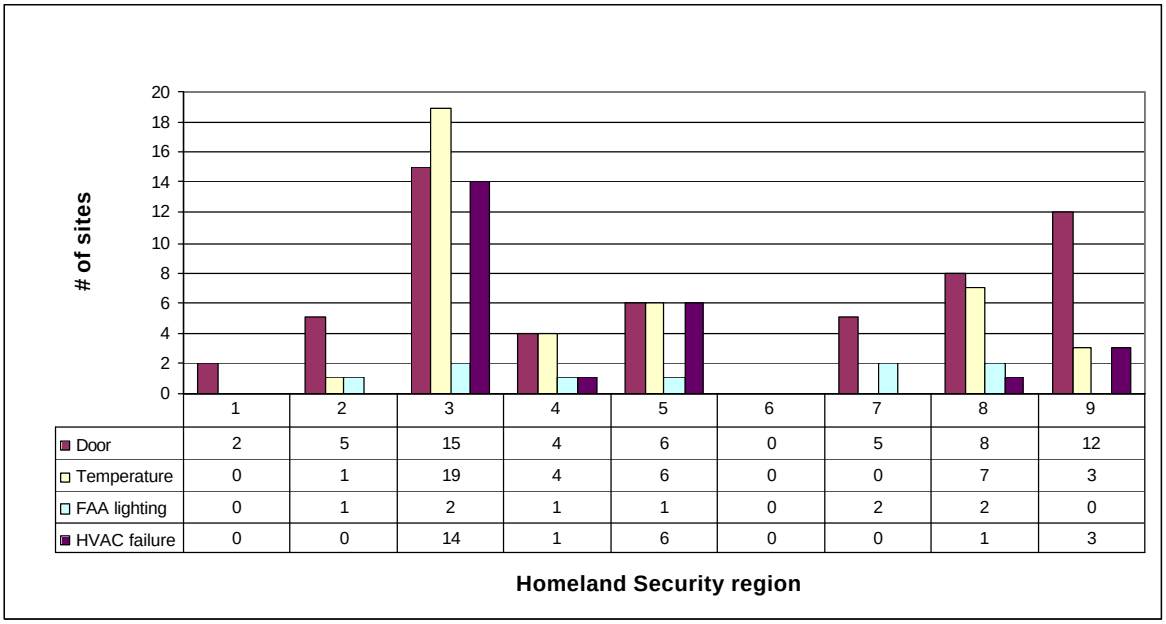


Agency	DFW	DNR	DOC	DOH	EMD	DOT	WSP
Local	0	0	1	0	1	0	1
Remote	0	0	0	0	2	0	0
Both	0	0	1	0	2	0	0

Figure 47 - Alarm systems installed by state agencies

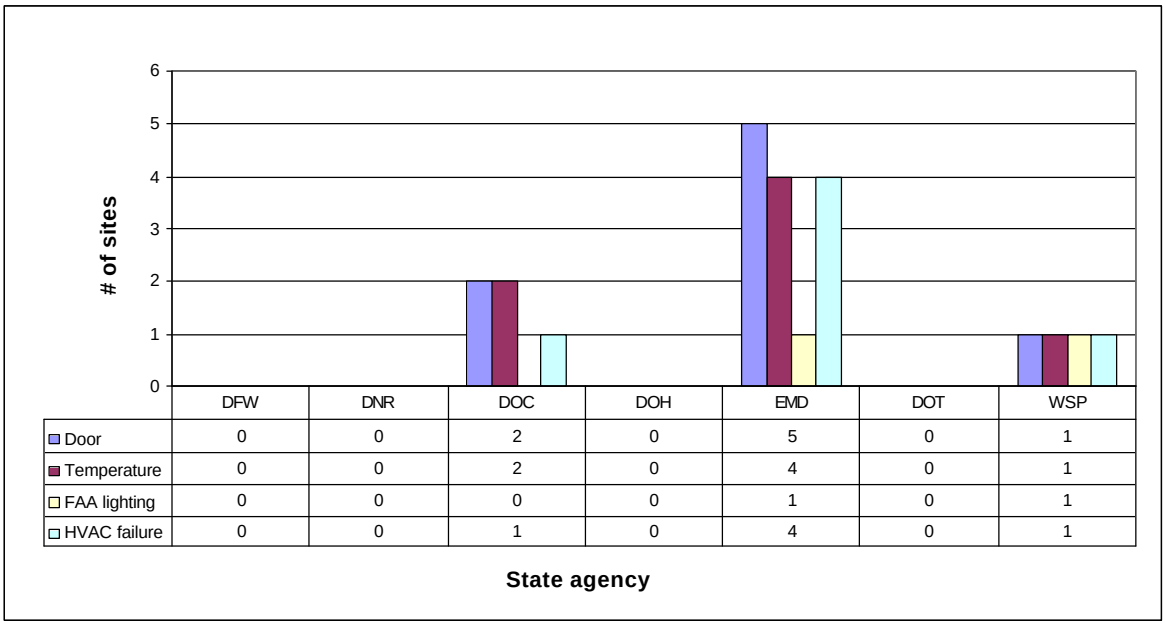
2.3.11 Elements monitored

Figure 48 and Figure 49 show the number and type of elements monitored. Facility access (door), environmental conditions (temperature), operation of HVAC and tower light operation were elements in the survey.



	1	2	3	4	5	6	7	8	9
Door	2	5	15	4	6	0	5	8	12
Temperature	0	1	19	4	6	0	0	7	3
FAA lighting	0	1	2	1	1	0	2	2	0
HVAC failure	0	0	14	1	6	0	0	1	3

Figure 48 - Elements alarmed by Homeland Security regions



	DFW	DNR	DOC	DOH	EMD	DOT	WSP
Door	0	0	2	0	5	0	1
Temperature	0	0	2	0	4	0	1
FAA lighting	0	0	0	0	1	0	1
HVAC failure	0	0	1	0	4	0	1

Figure 49 - Elements alarmed by state agencies

2.3.12 Inter-site communications

Inter-site communications systems are used to interconnect all radio sites and communications centers. Several technologies are employed to provide these connections. Table 10 shows the type of connections reported for various entities throughout the state, based on the data reported by the 19 counties responding.

County	Analog Microwave	Digital Microwave	Fiber Optic	Radio Circuits	Terrestrial Circuits
Benton					Hanford Fire Department
Chelan		Rivercom		Rivercom	
Clallam				Port Angeles Police Department	
Clark		Clark Regional Emergency Services Agency			
Columbia				Columbia County Sheriff's Office	Columbia County Sheriff's Office
Ferry				Ferry County Emergency Management	
Grays Harbor		Grays Harbor E9-1-1 Communications		Aberdeen Police Department, Ocean Shores Police	
King		Bothell Police Department			
Kitsap	Bremerton Police Department	Kitsap County Central Communications (9-1-1)			
Kittitas		Kittitas County 9-1-1	Kittitas County 9-1-1		
Pacific		Pacific County Communications			Pacific County Fire District 1
Pend Oreille	Pend Oreille County Department of Emergency Management				
Pierce		City of Tacoma, Pierce County	City of Tacoma	Puyallup City Communications, Fife Police Department	
Skagit		Mount Vernon Fire Department			
Spokane	Spokane County Communications	Spokane County Communications			Cheney Police Department
Thurston		Capital Communications			Thurston County Fire Protection District 8
Walla Walla	Walla Walla Public Safety Communications				
Whatcom				What-Comm	
Yakima	City of Yakima, Yakima Fire Department				
Statewide	Washington State Department of Transportation, Department of Corrections, Department of Natural Resources			Washington State Department of Transportation	Department of Corrections
Statewide		Emergency Management Division, Military Department			
Statewide	Washington State Patrol				

Table 10 - Inter-site communications used within counties/areas

2.3.13 Microwave technology

Figure 50 and Figure 51 show the utilization of analog and digital microwave technology by Homeland Security regions and state agencies.

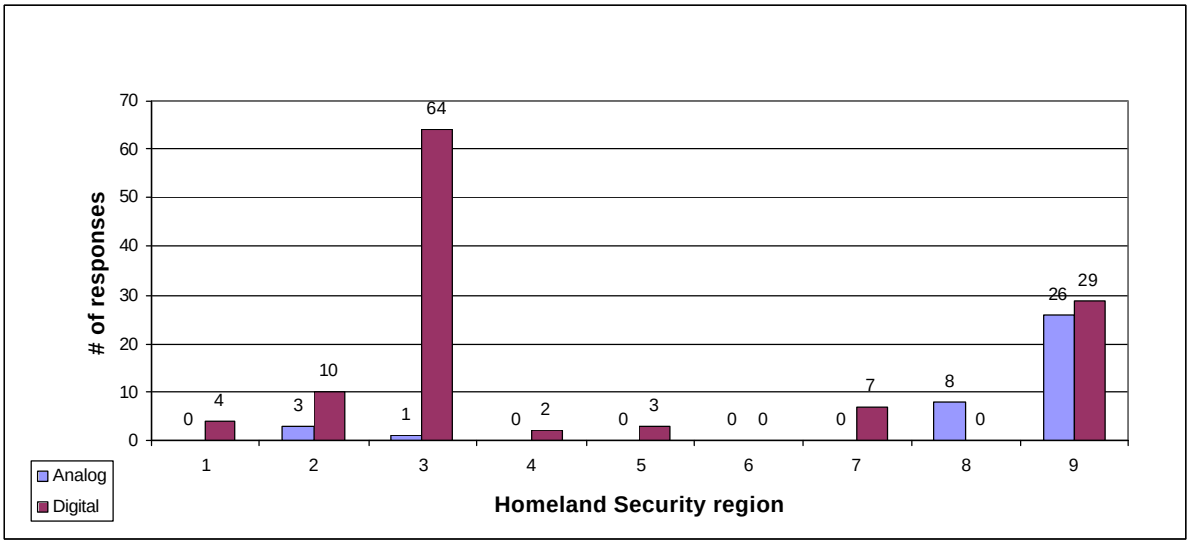


Figure 50 - Microwave technology reported by Homeland Security regions

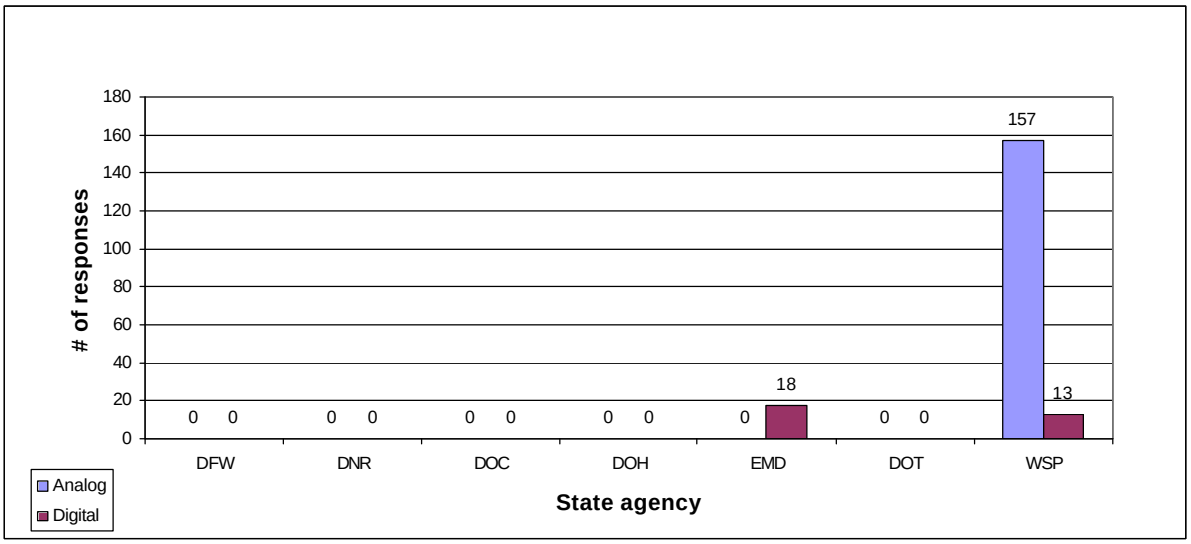


Figure 51 - Microwave technology reported by state agencies

2.4 Technical - other methods of communicating

2.4.1 Introduction

Data from the other methods of communicating section of the study came from 150 responders who answered at least one of the questions in the section. Each response is treated equally. The makeup of the responders using the “agency mission” category used in the survey is as shown in Table 11.

Responding agency	Responses
EMS - government operated EMS	2
EMS - non-government operated/private EMS	1
Fire - city fire department	18
Fire - county fire department/district	24
Fire - fire protection district	8
Fire - industrial fire district	1
Fire - volunteer fire district	1
Law enforcement - county jail	1
Law enforcement - police department	39
Law enforcement - sheriff's office	17
Law enforcement - tribal police department	2
Other	7
Other - emergency management center	6
Other - PSAP	19
Other - public services	2
Other - public utilities	1
Other - search and rescue	1

Table 11 - Source of data - other methods of communicating

2.4.2 Cellular/satellite telephones

Cellular telephones provide back-up communications for land mobile systems in many areas. Nextel, Verizon, AT&T and Unicell are the most used service providers of cellular communications to public safety agencies as indicated by responses to the survey. Satellite telephones are in limited use. The number of cellular and satellite telephones per county is shown in Figure 52 and Figure 53.

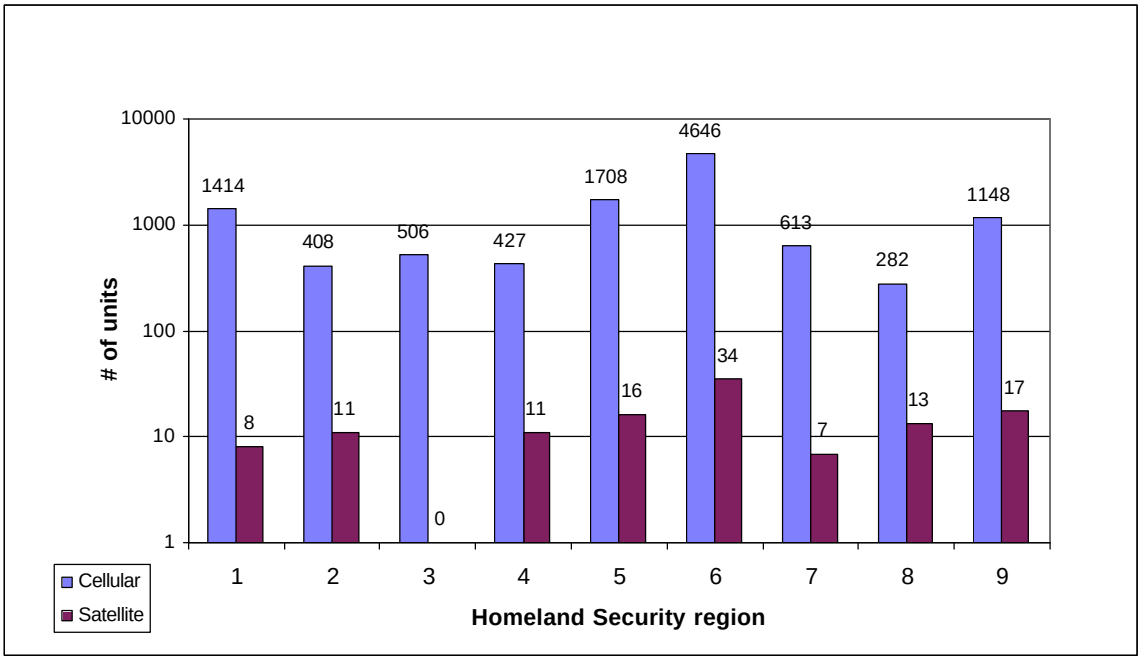


Figure 52 - Wireless telephones reported by Homeland Security regions

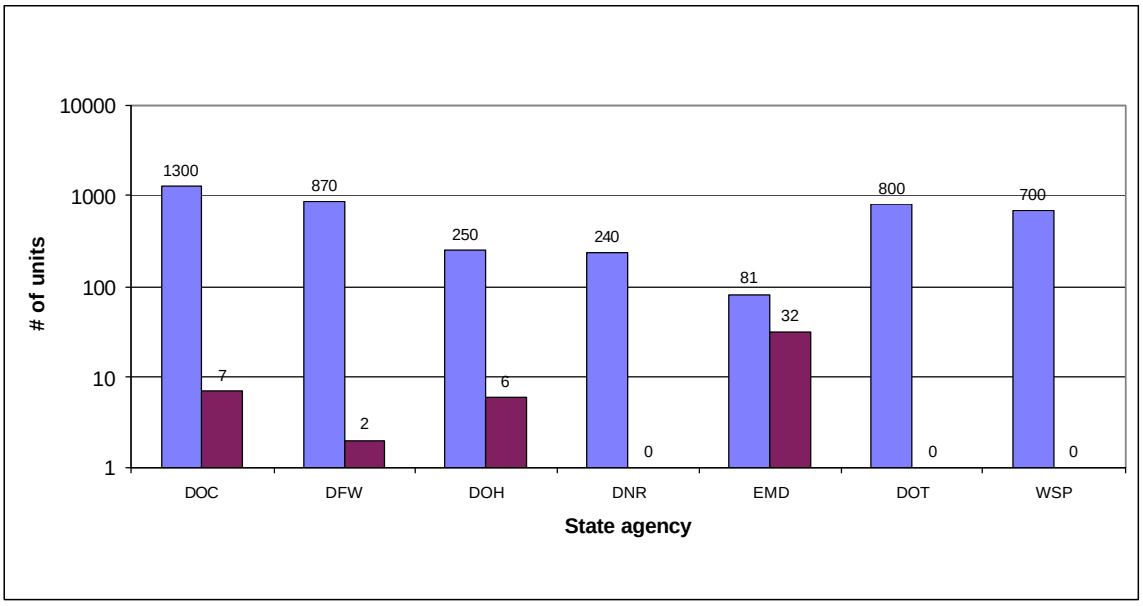


Figure 53 - Wireless telephones reported by state agencies

2.4.3 Pagers

Paging service is provided by a combination of county owned, local service provider and national service providers.

Figure 54 and Figure 55 show pager usage. Figure 56 shows the number of agencies using private vs. commercial paging services.

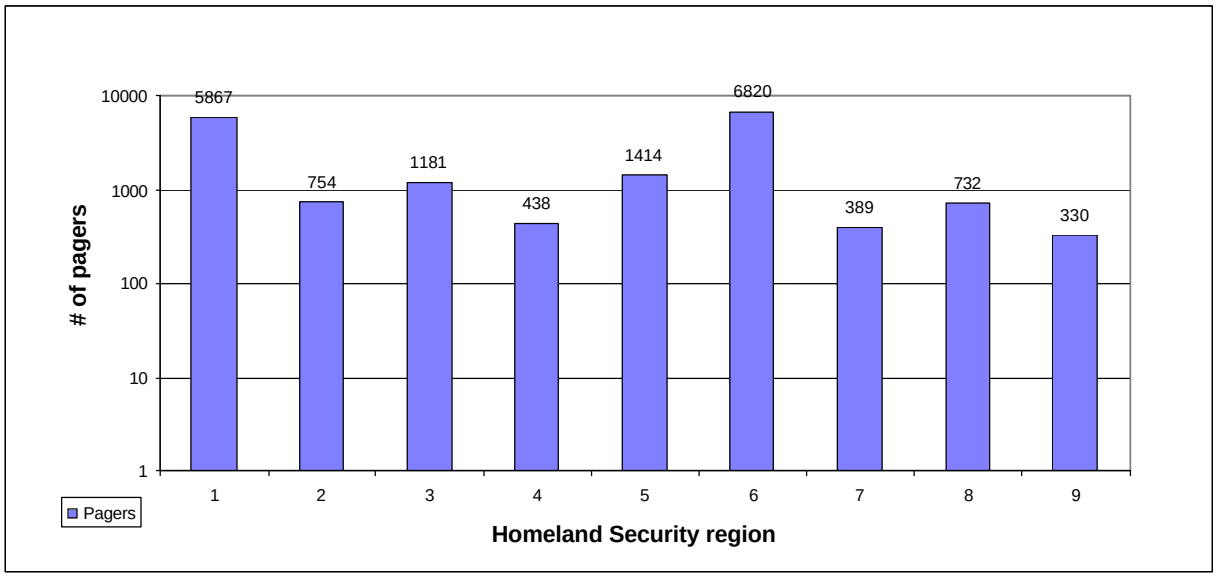


Figure 54 - Pagers reported by Homeland Security region

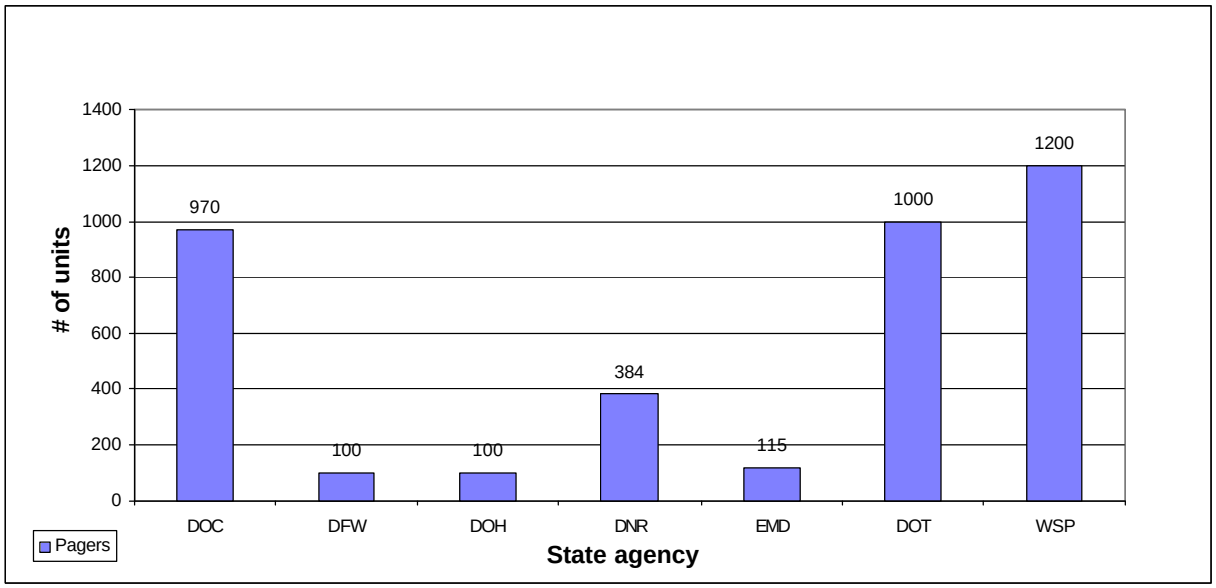


Figure 55 - Pagers reported by state agencies

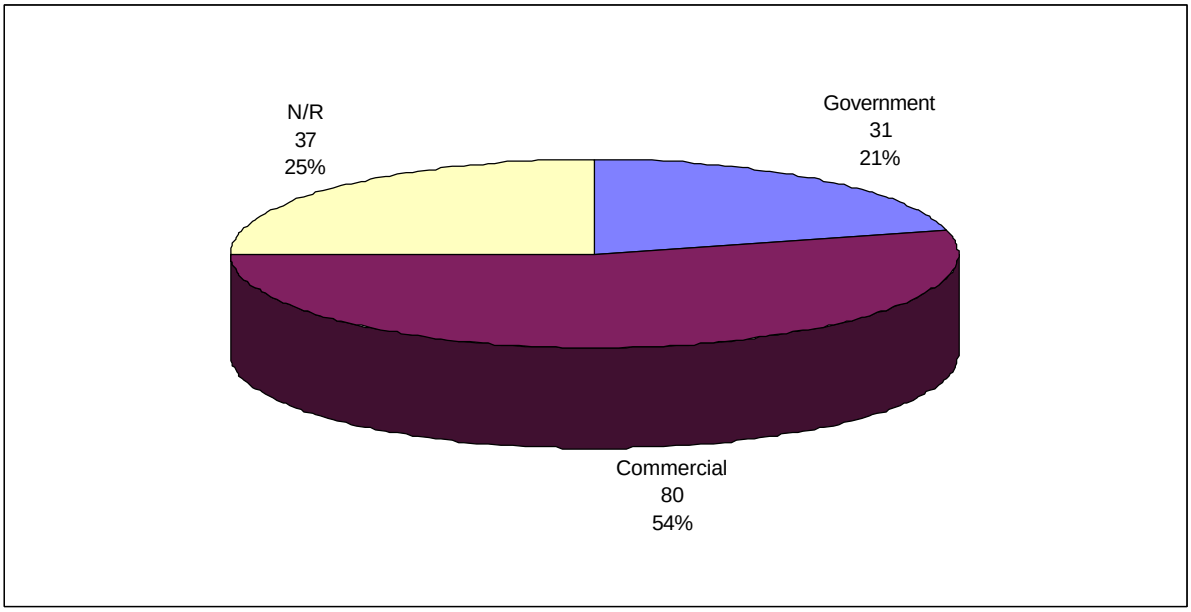


Figure 56 - Paging services ownership

2.4.4 Mobile (wireless) data

The mobile/wireless data terminal equipment used by most survey participants is Panasonic with 1782 units. See Figure 57.

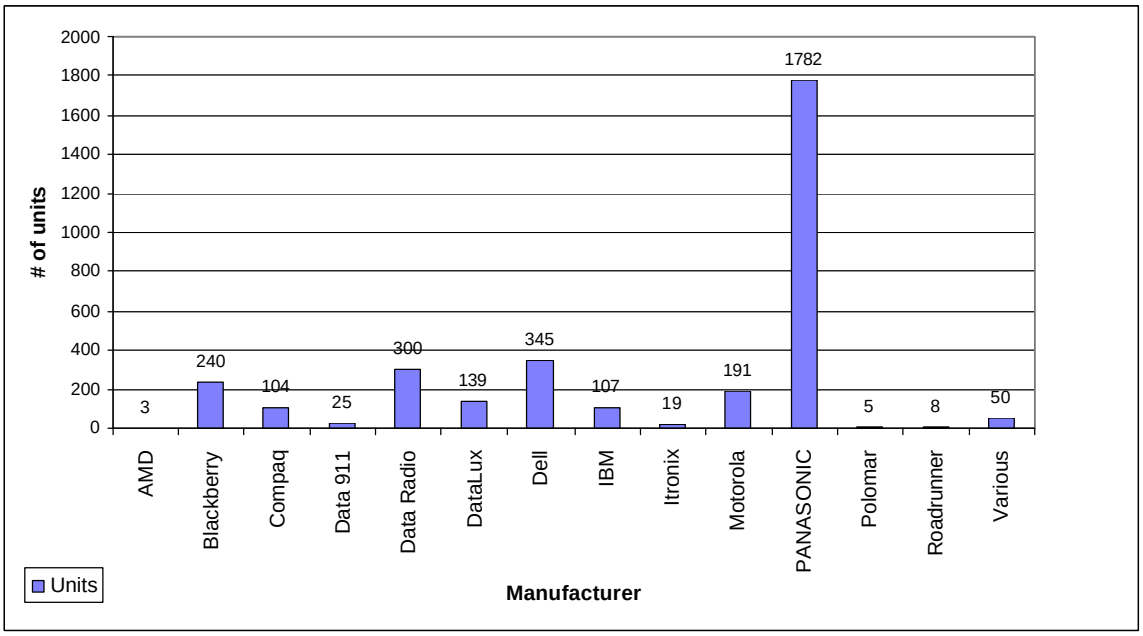


Figure 57 - Manufacturers of mobile data terminals used

Mobile data terminal technology is deployed in the regions and state agencies as shown in Figure 58 and Figure 59.

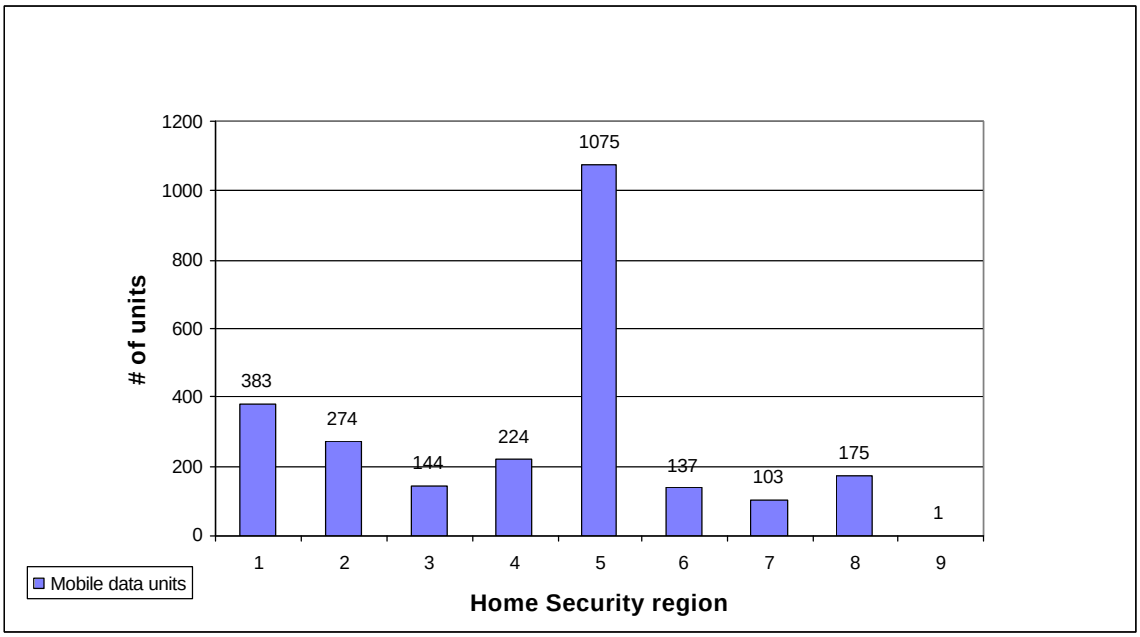


Figure 58 - Mobile data terminals in use by Homeland Security regions

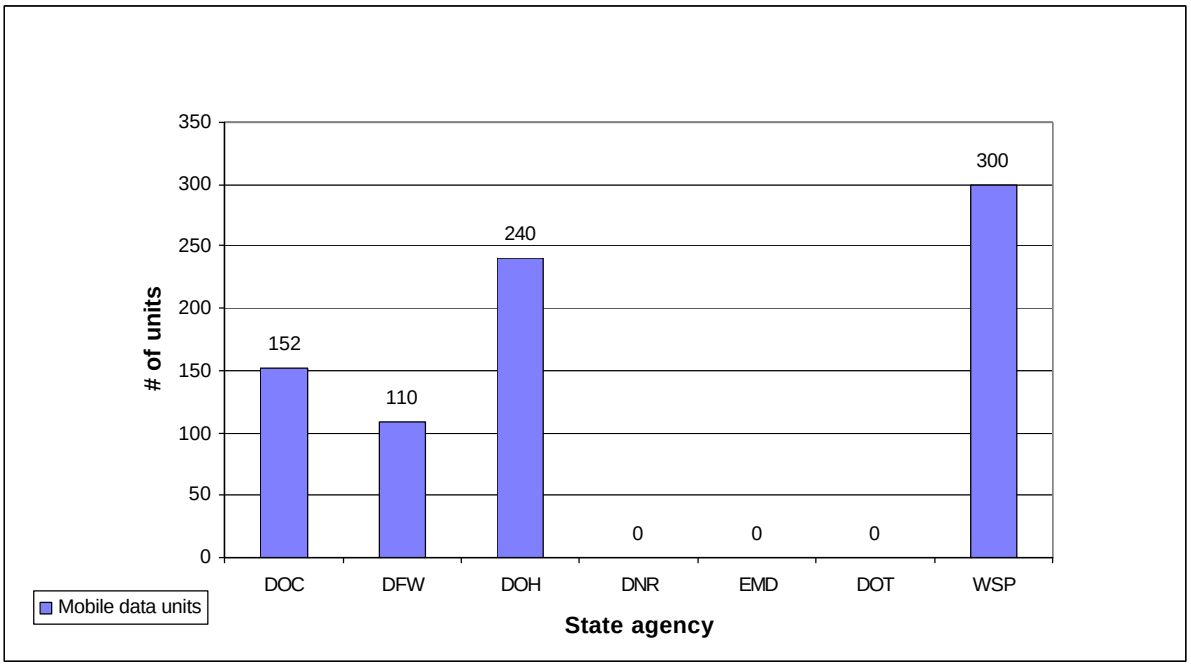


Figure 59 - Mobile data terminals in use by state agencies

Thirty-seven percent of responders reported that mobile data service is provided by private commercial operators, as shown in Figure 60.

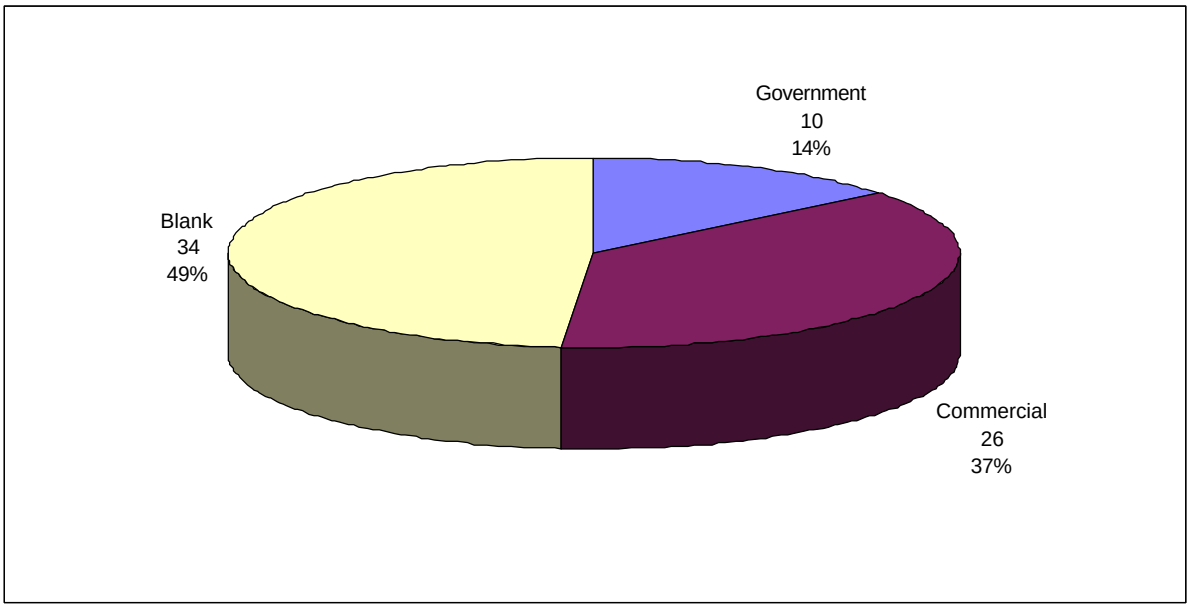


Figure 60 - Mobile data system ownership

2.4.5 Characteristics of mobile data use

Mobile data is primarily used for database access and messaging. The survey indicated that most responders envision the future use of still images, video images, report writing and Web access. With the advent of newer technology, there appears to be a significant increase in planned use. The largest projected increase is in the use of video images – an increase of more than 1,200 percent. See Figure 61.

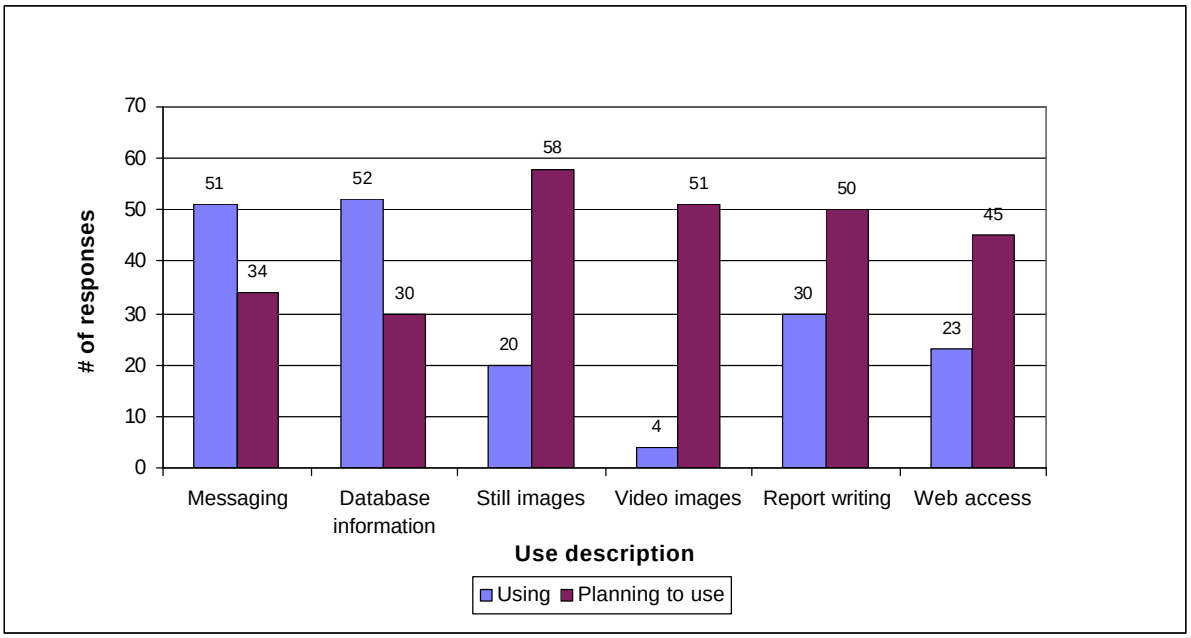


Figure 61 - Current and projected mobile data use

2.4.6 Mobile data applications accessed

The survey asked for the average number of transactions per user per week in seven categories:

- local records management systems (RMS)
- local computer aided dispatch (CAD)
- local geographic information systems (GIS)
- Washington State Department of Licensing (DOL)
- National Law Enforcement Telecommunications System (NLETS)
- National Crime Information Center (NCIC-2000)
- other

The "other" category includes:

- local warrants
- sex offender
- department-specific Offender Based Tracking System (OBTS)

The maximum, minimum and average for the number of transactions per user per week are represented in Figure 62. The highest transactions are from state DOL, local RMS and local CAD.

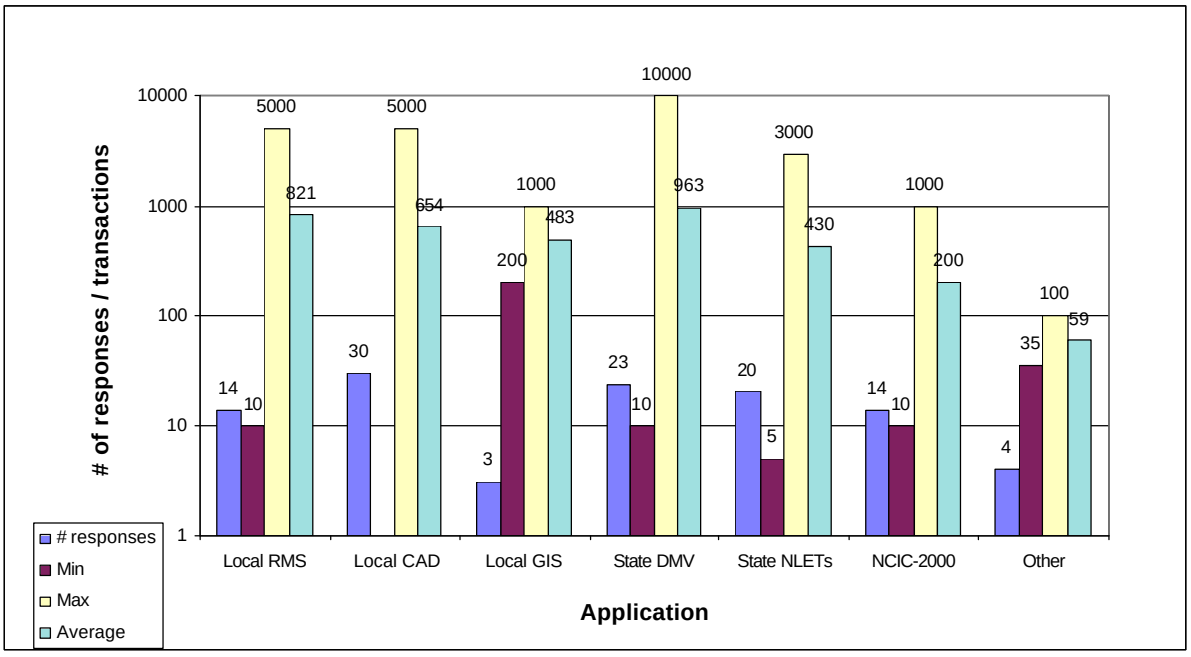


Figure 62 - Average transactions per user per week

2.5 Technical - interoperability

2.5.1 Introduction

Data from the interoperability section of the study came from 150 responders who answered at least one question in the section. Each response is treated equally. The makeup of the responders using the "agency mission" category is shown in Table 12.

Agency	Responses
EMS - government operated EMS	2
EMS - non-government operated/private EMS	1
Fire - city fire department	16
Fire - county fire department/district	22
Fire - fire protection district	8
Fire - industrial fire district	1
Fire - volunteer fire district	1
Law enforcement - county jail	1
Law enforcement - police department	42
Law enforcement - sheriff's office	18
Law enforcement - tribal police department	2
Other	7
Other - emergency management center	5
Other - PSAP	18
Other - public services	2
Other - public utilities	2
Other - search and rescue	1
Other - transportation	1

Table 12 - Source of data - interoperability

2.5.2 The role of the command center

Figure 63 shows the number of agencies, by agency mission, dispatching their own calls.

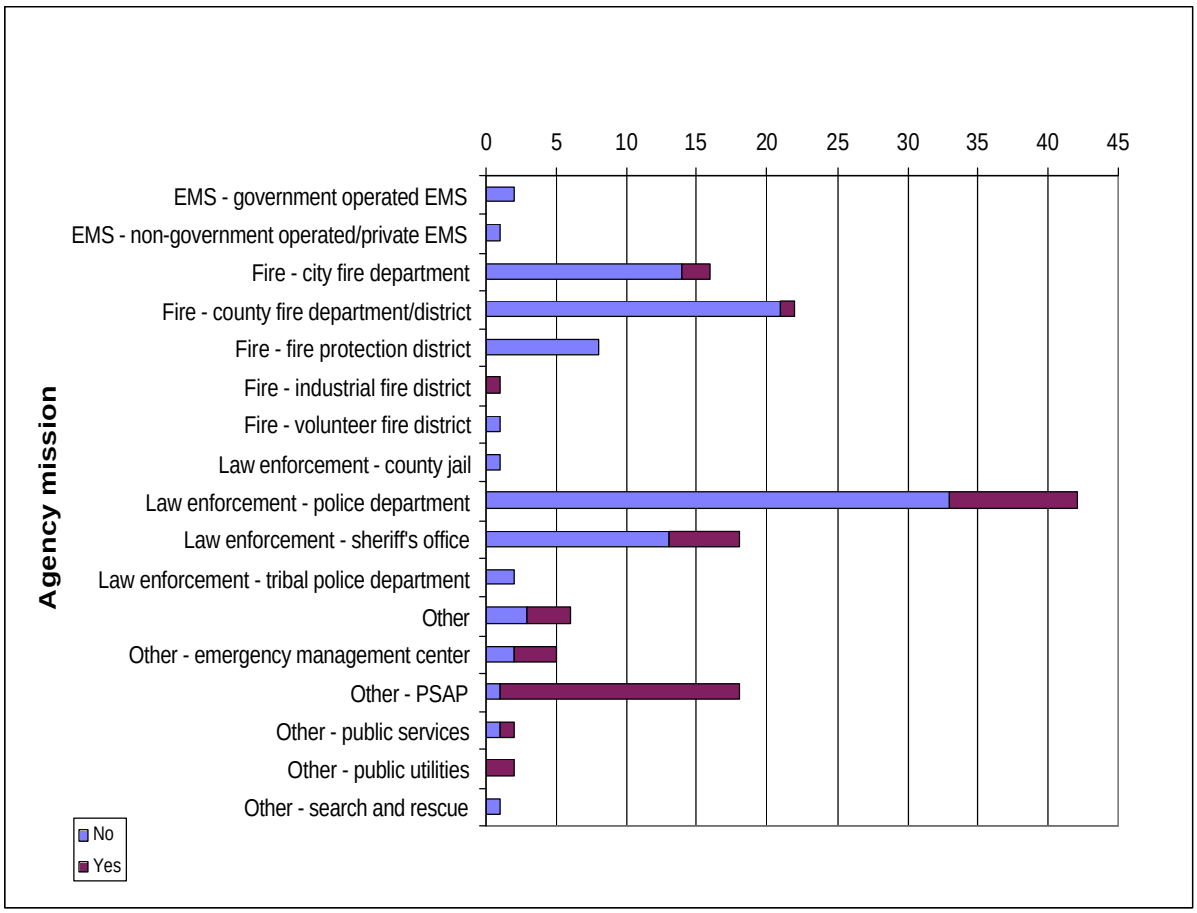


Figure 63 - Agencies that dispatch, by agency mission, their own calls

The survey asked the responder to estimate the percentage of calls that involved mutual aid. The responses were grouped in 10 percent increments. For example, 88 responders indicated that up to 10 percent of their calls involved mutual aid. Calls involving mutual aid or assistance were included in the analysis.

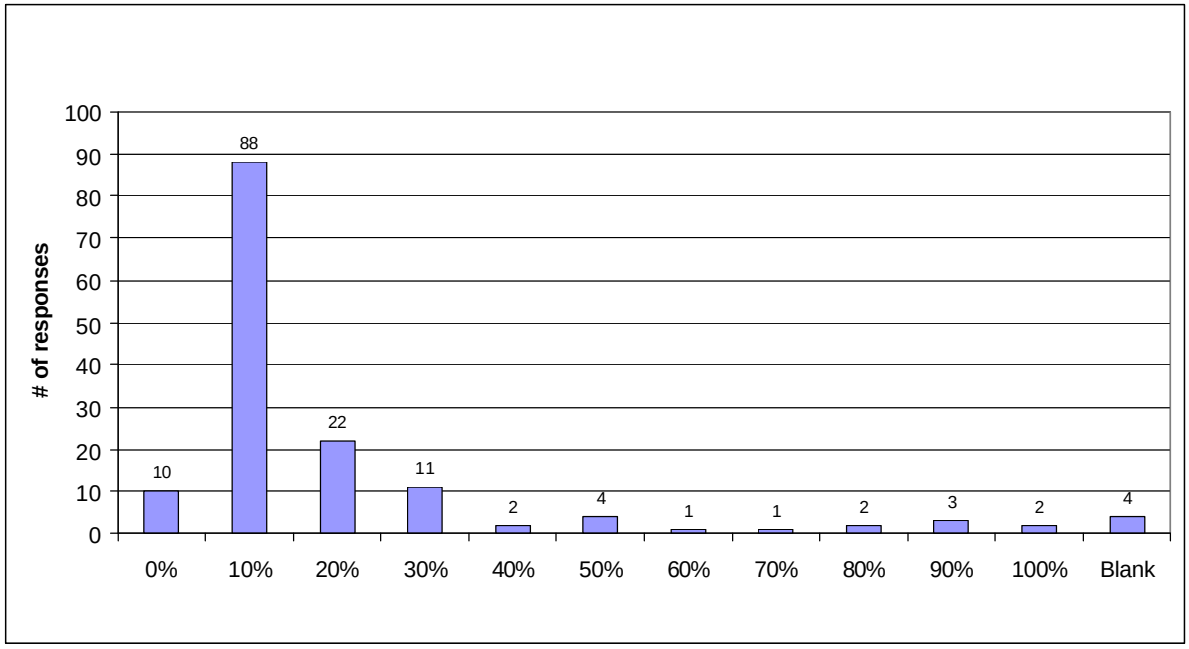


Figure 64 - Percentage of calls involving mutual aid

Multi-jurisdictional or multi-discipline emergencies that occur most often are fire and motor vehicle accidents. A breakout of the responses received in the survey were categorized and listed in Figure 65.

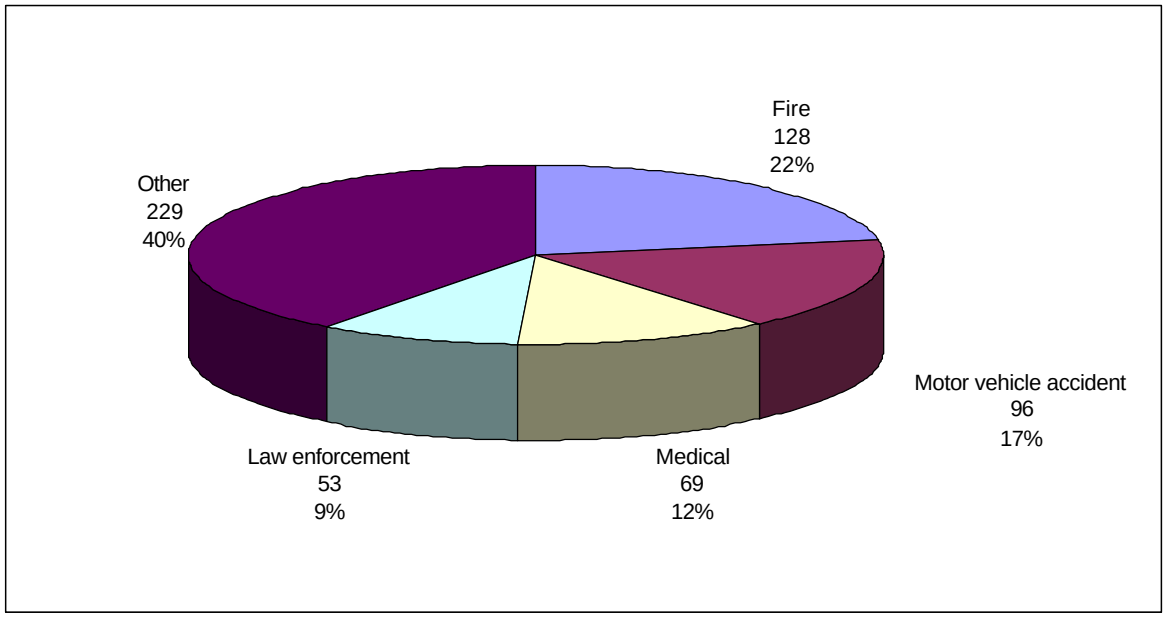


Figure 65 - Most frequent multi-jurisdictional or multi-discipline incidents

Items included in the “other” category include:

- 9-1-1 hang-ups
- Agency assists
- Alarms
- Assault
- Automatic responses to commercial facilities
- Automatic responses to schools
- Bank robberies
- Barricaded subject
- Bomb threats
- Courtesy follow up/reports
- Cover out of town calls
- Disturbances
- Domestic violence
- Down power lines
- Drug enforcement
- Fish and game violations
- Follow-up suspect leads
- HAZMAT
- Hiking and climbing emergencies
- Infrastructure failures
- Internal calls
- Investigation by outside agency
- Jurisdiction boundary calls
- Marine
- Meetings
- Messages
- Move up to cover
- Mutual aid police
- Natural disasters
- Natural gas leaks
- Notifications
- Officer needs assistance
- Oil spills
- Pole damage
- Pursuits
- Search and rescue
- Service call
- Special operations
- Technical rescue
- Theft
- Traffic control
- Training
- Warrants
- Weather
- Welfare check

Responders were asked about two scenarios involving communication with multiple agencies. The first involved multi-agency/multi-jurisdiction communication on a daily emergency basis and the second multi-agency/multi-jurisdiction communication during a major incident. A major incident would be one in which a remote command center may have been established for coordination and a large percentage of resources is involved.

For daily emergencies, responders were asked if they were able to contact the assisting agencies with their radio, as shown in Figure 66.

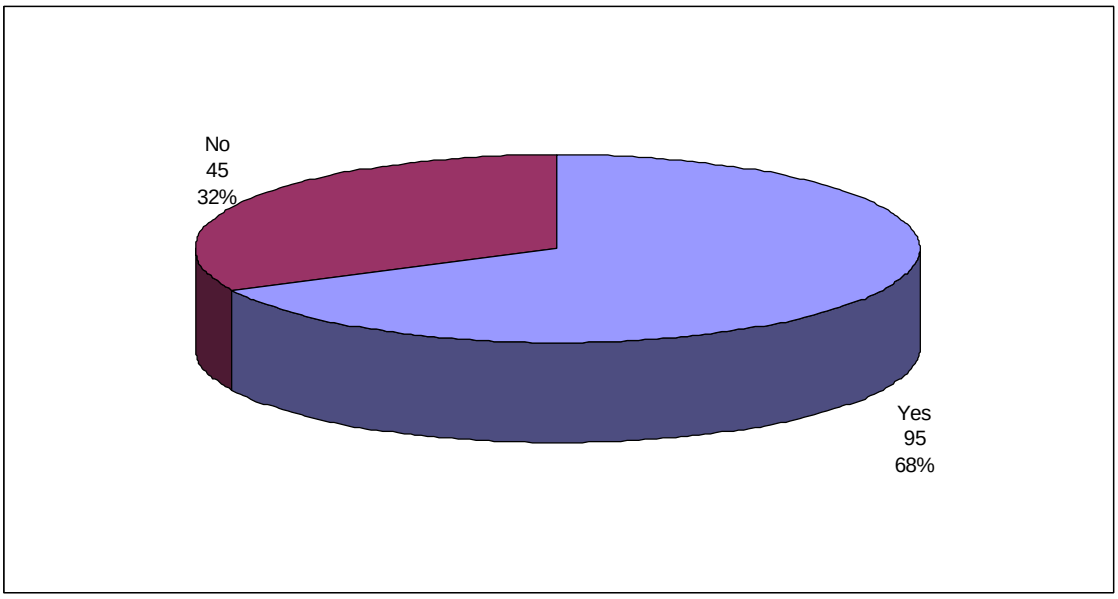


Figure 66 - Multi-agency interoperability

Responders were asked if their dispatch center had to intervene to enable them to communicate with the assisting agencies. Sixty-six percent indicated that this intervention was required.

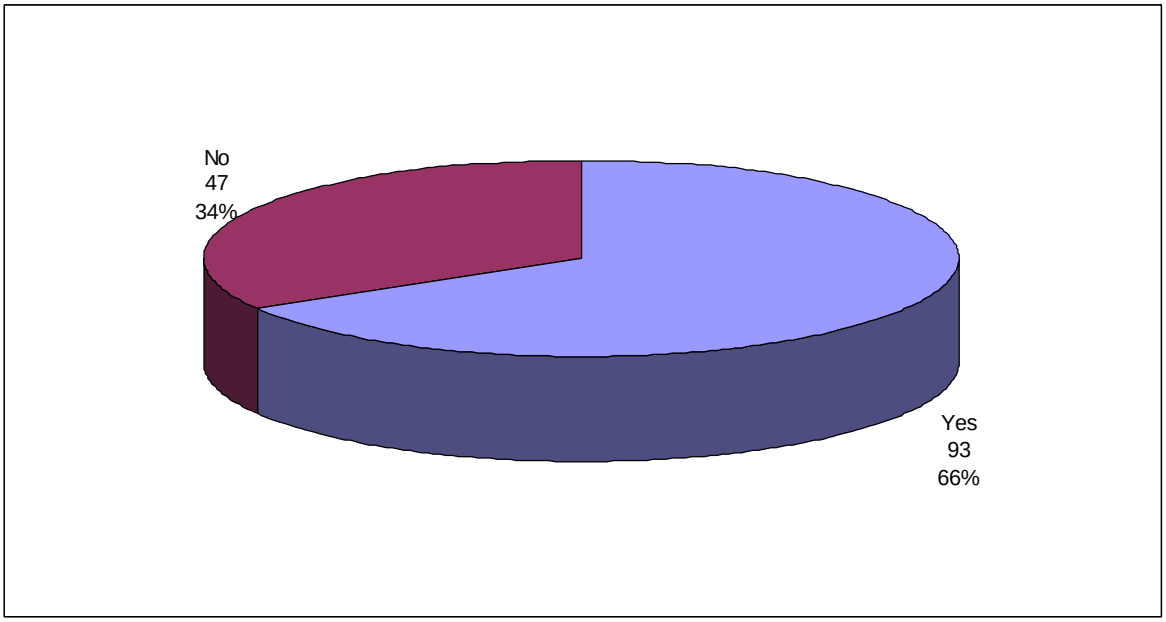


Figure 67 - Daily multi-agency response dispatch intervention

2.5.3 Large scale operation

Responders were asked to provide a list of three large-scale operations or task force incidents in which they have participated. The list was summarized and categorized. The most frequent responses are found in Figure 68.

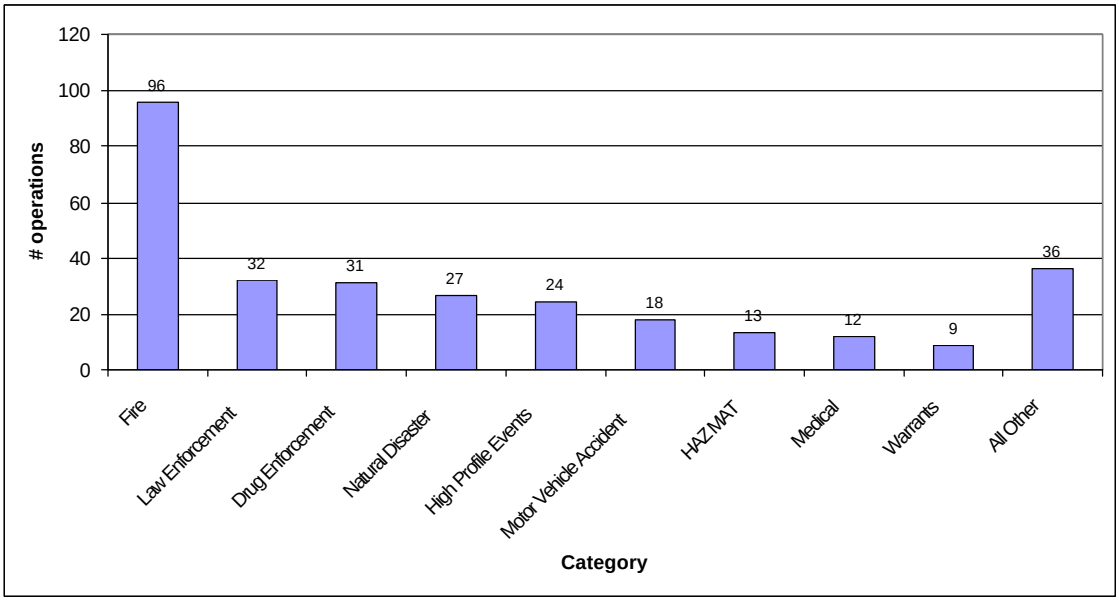


Figure 68 - Large-scale operations

Sixty-seven percent of the responders indicated that they were able to establish communications with other agencies in large-scale operations. See Figure 69.

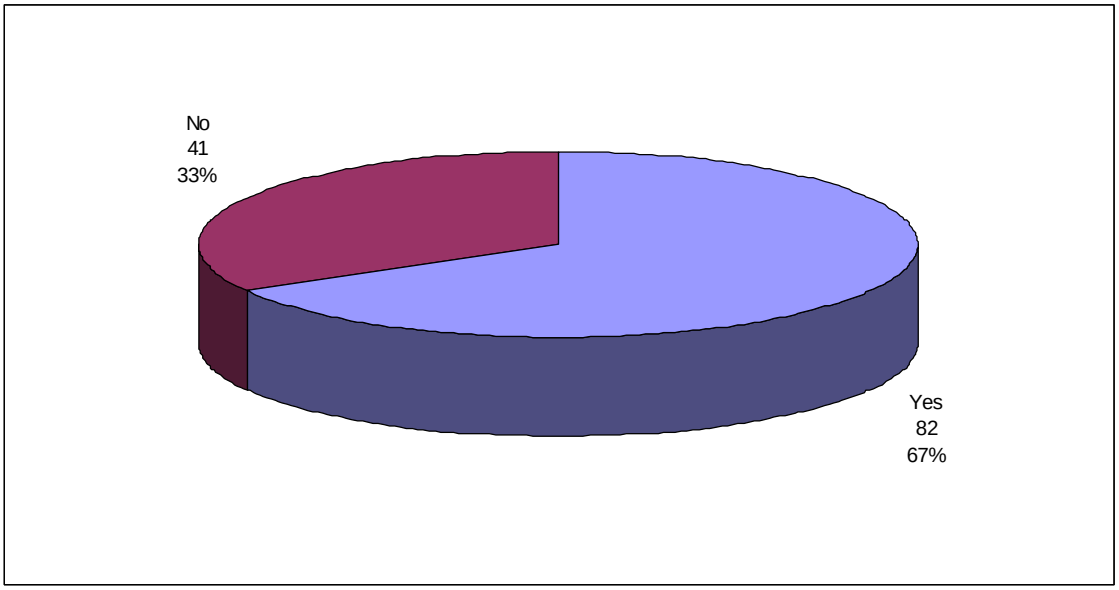


Figure 69 - Large-scale operations interoperability

Sixty-seven percent of those agencies also indicated that they required the dispatch center to intercede for their communications needs (see Figure 70).

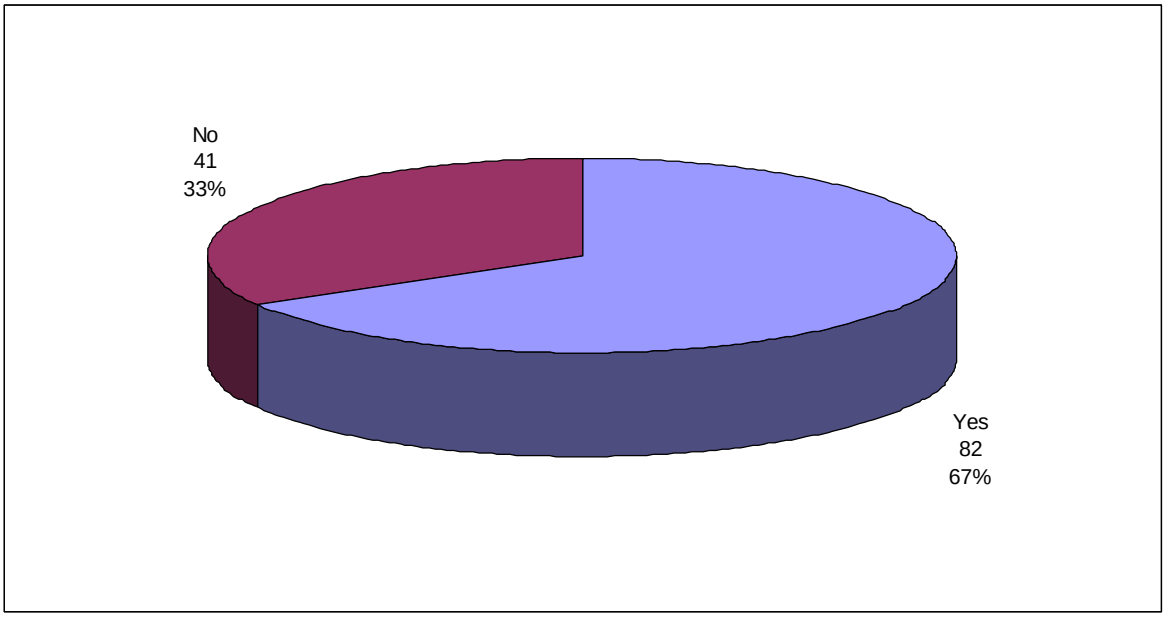


Figure 70 - Large-scale operations - dispatch intervention

2.5.4 Interoperability equipment

Responders were asked if they have any specific interoperable equipment or equivalents. Table 13 shows the equipment listed in the responses.

Agency	Benton County Emergency Services	What-Comm	Thurston County Dept of Communications-	Rivercom	Pierce County	Harborview MC	What-Comm	Redmond Police Department	Washington State Patrol	Thurston Co Fire District Six	King County	Emergency Management Division, Military	SNOPAC 9-1-1	Mount Vernon Fire	Department of Corrections	Grays Harbor E9-1-1 Communications
ICRI	5	1	0	0	0	1	1	0	0	1	2	2	0	0	0	0
JPS/Raytheon ACU-1000	0	0	1	0	1	0	0	1	10	0	2	0	1	1	1	1
LinkComm Units - Crossband repeater	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorola Centracom console	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Internally built crossband repeaters	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0

Table 13 - Gateway devices in use

Responders were asked if their agency has a way to connect two or more agencies without using a gateway device or intervention by the dispatch center. Among the responders, 71 percent did not have this capability.

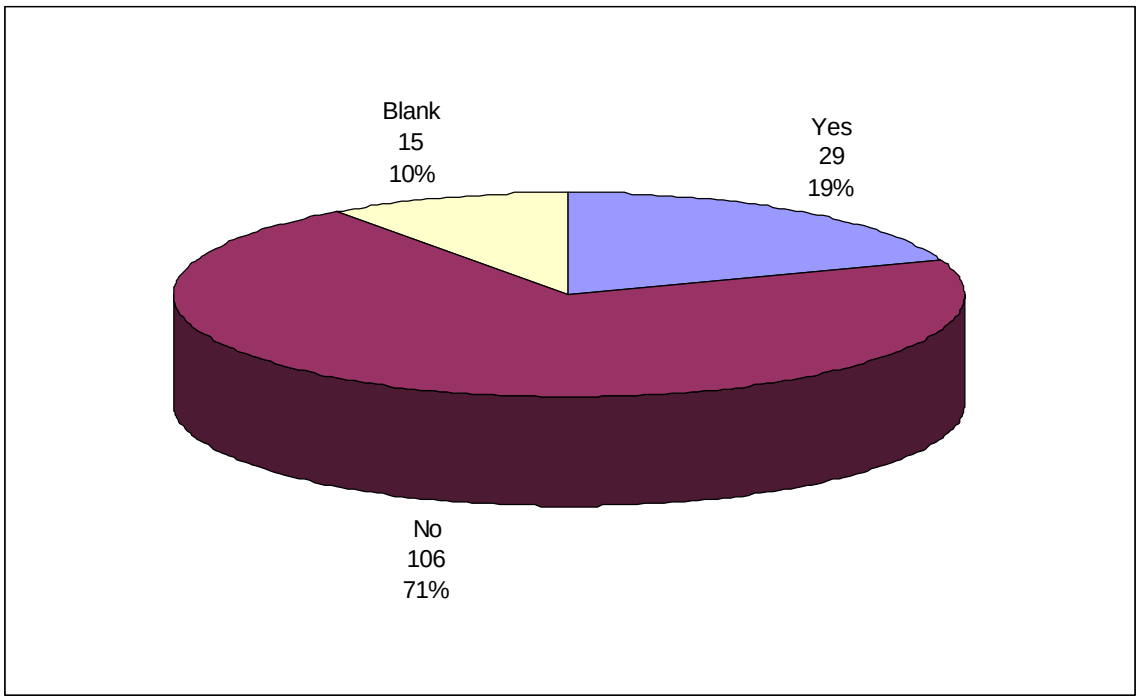


Figure 71 - Use of gateway devices or crosspatch

Responders were asked about the effectiveness of cross-patching for interoperability. Fifty-seven percent believe that it is effective and about fifteen percent believe it does not work. See Figure 72 for details.

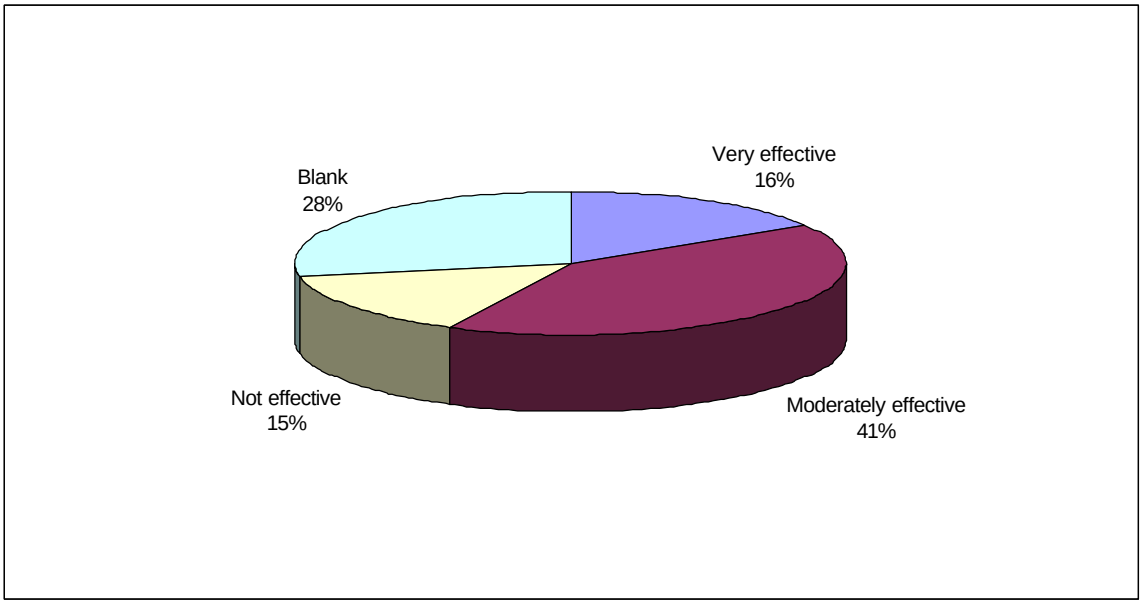


Figure 72 - Effectiveness of crosspatch

2.5.5 Ability, method and future needs

Responders were asked to rate the current ability, current method and future need to be interoperable with other agencies that have similar missions. Ratings were on a one-to-five scale, with one being the lowest and five being the highest. Responders also had the opportunity to list and rate other agencies that did not appear in the list.

The responses were sorted according to the mission of the responder's agency. Table 14 is a list of agencies given to the responder in the order they appeared in the survey.

The responses were sorted by the responder's agency mission and averaged. Figures 73-88, in this section, indicate how strongly the agency believes it needs to be interoperable with other agencies that are listed in Table 14.

- Law enforcement
- Local EMS
- Local public service
- Other local agency
- Intra-county law enforcement
- Intra-county EMS
- Intra-county transportation
- Intra-county agency
- Neighboring county local law enforcement
- Neighboring county local EMS
- Other neighboring county agency
- State law enforcement
- Other state agency
- Neighboring state law enforcement
- Neighboring state forest service
- Canadian agency
- Local fire
- Local transportation
- Local port police
- Federal forest service
- Intra-county fire
- County EMA
- Intra-county public service
- Coast Guard
- Neighboring county local fire enforcement
- Neighboring county EMA
- FEMA/DHS
- State EMA
- Other federal agency
- Neighboring state EMA
- Other neighboring state agency
- FBI

Table 14 - List of agencies

Based upon data collected (shown in Figures 73-88), it is clear that the majority of responders believe that the current methods of achieving interoperability are marginally effective. It is also clear that the majority of responders believe that current and future needs for creating an interoperable system will accelerate.

2.5.5.1 Law enforcement - police department

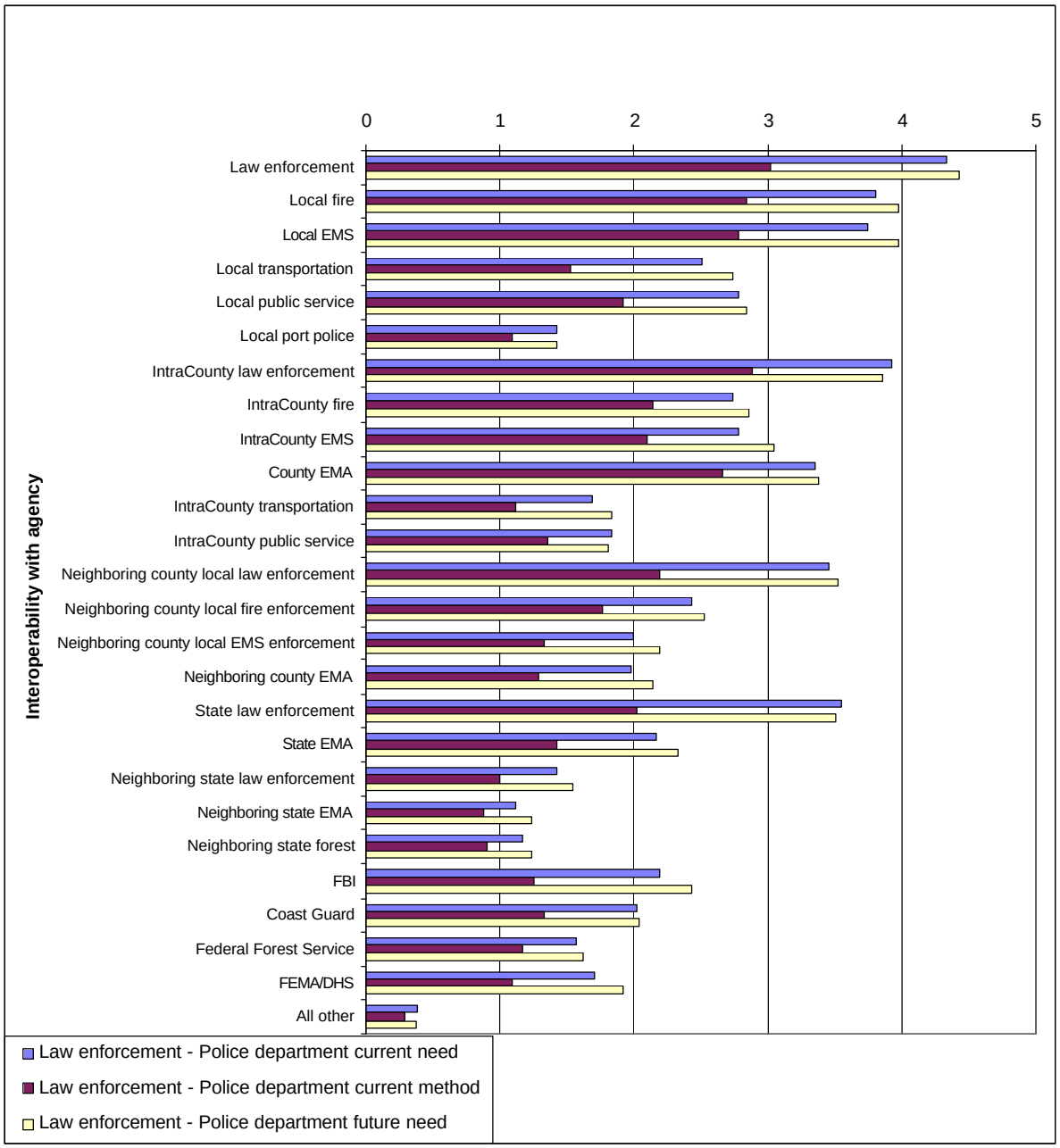


Figure 73 - Police department interoperability with other agencies

2.5.5.2 Law enforcement – sheriff's office

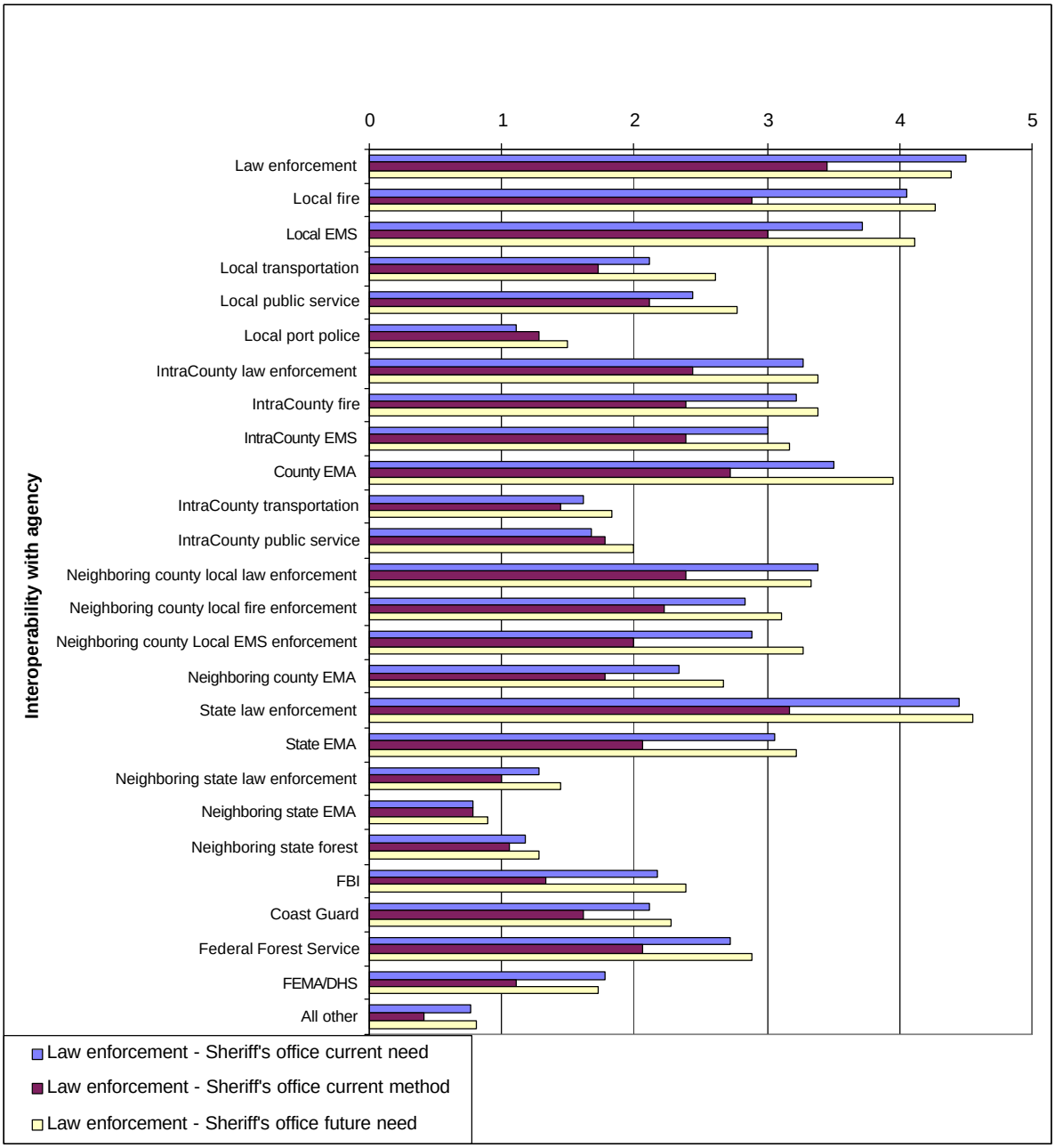


Figure 74 - Sheriff's office interoperability with other agencies

2.5.5.3 Law enforcement - tribal police department

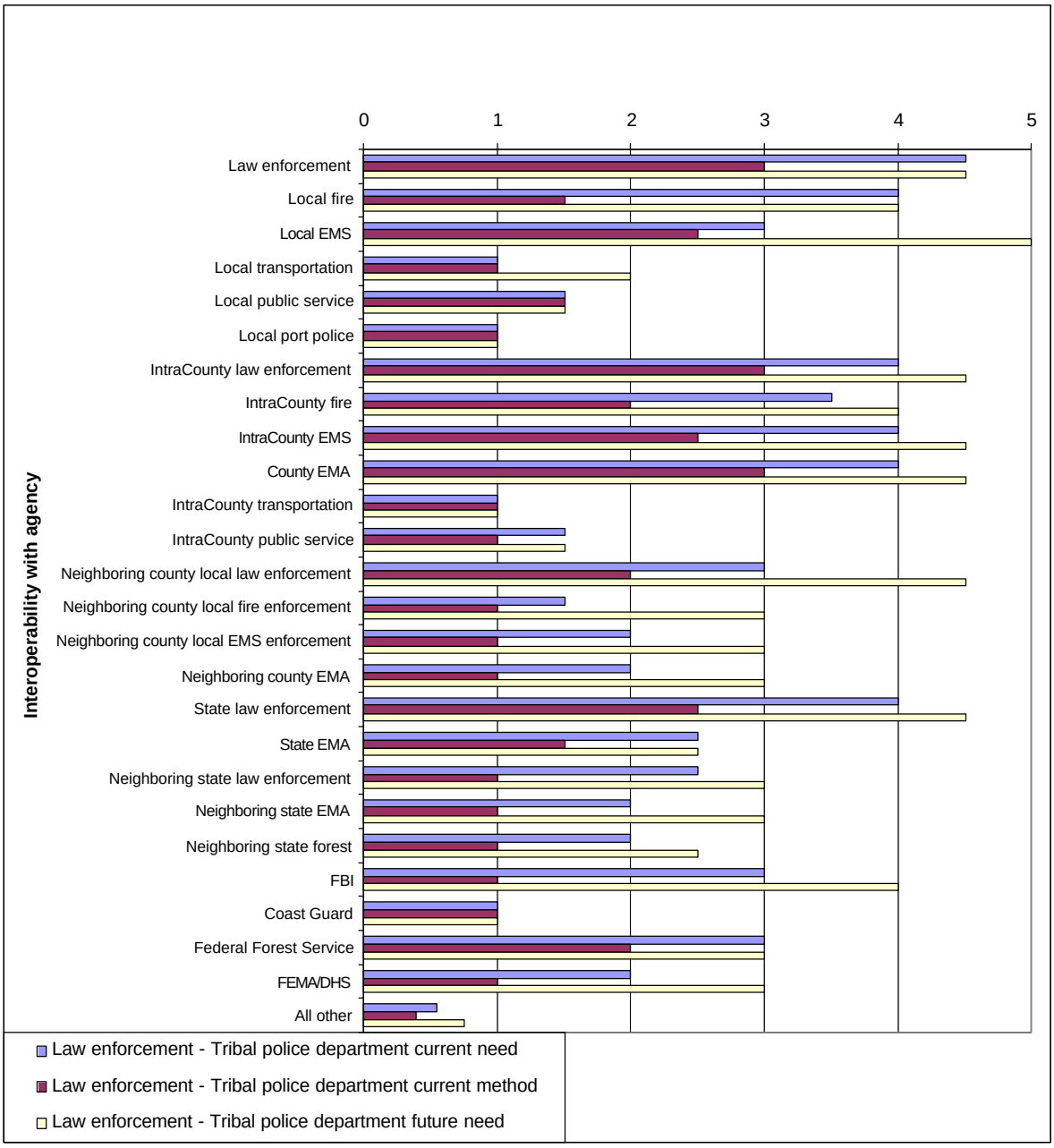


Figure 75 - Tribal police department interoperability with other agencies

2.5.5.4 Law enforcement - county jail

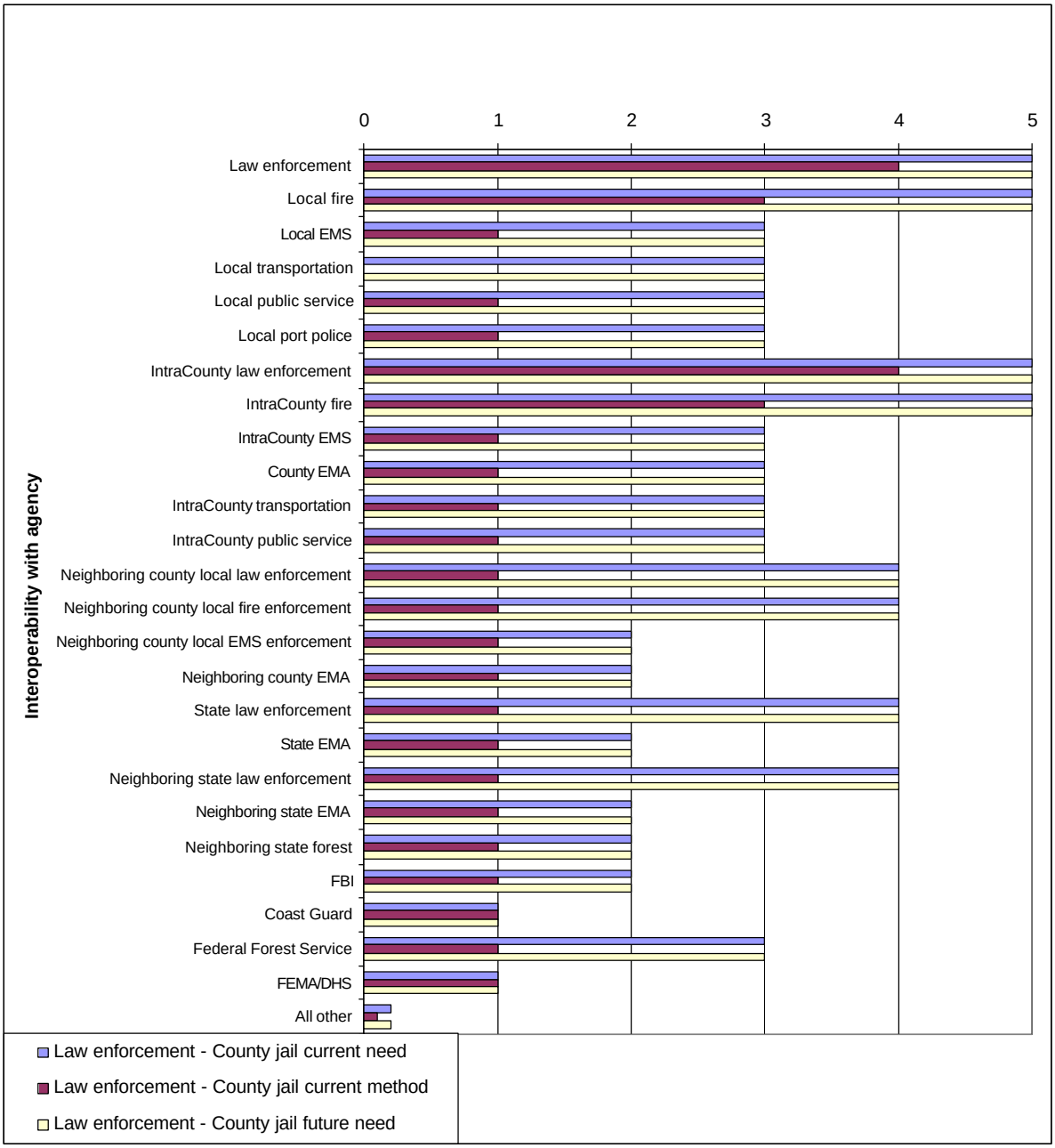


Figure 76 - County jail interoperability with other agencies

2.5.5.5 Fire - city fire department

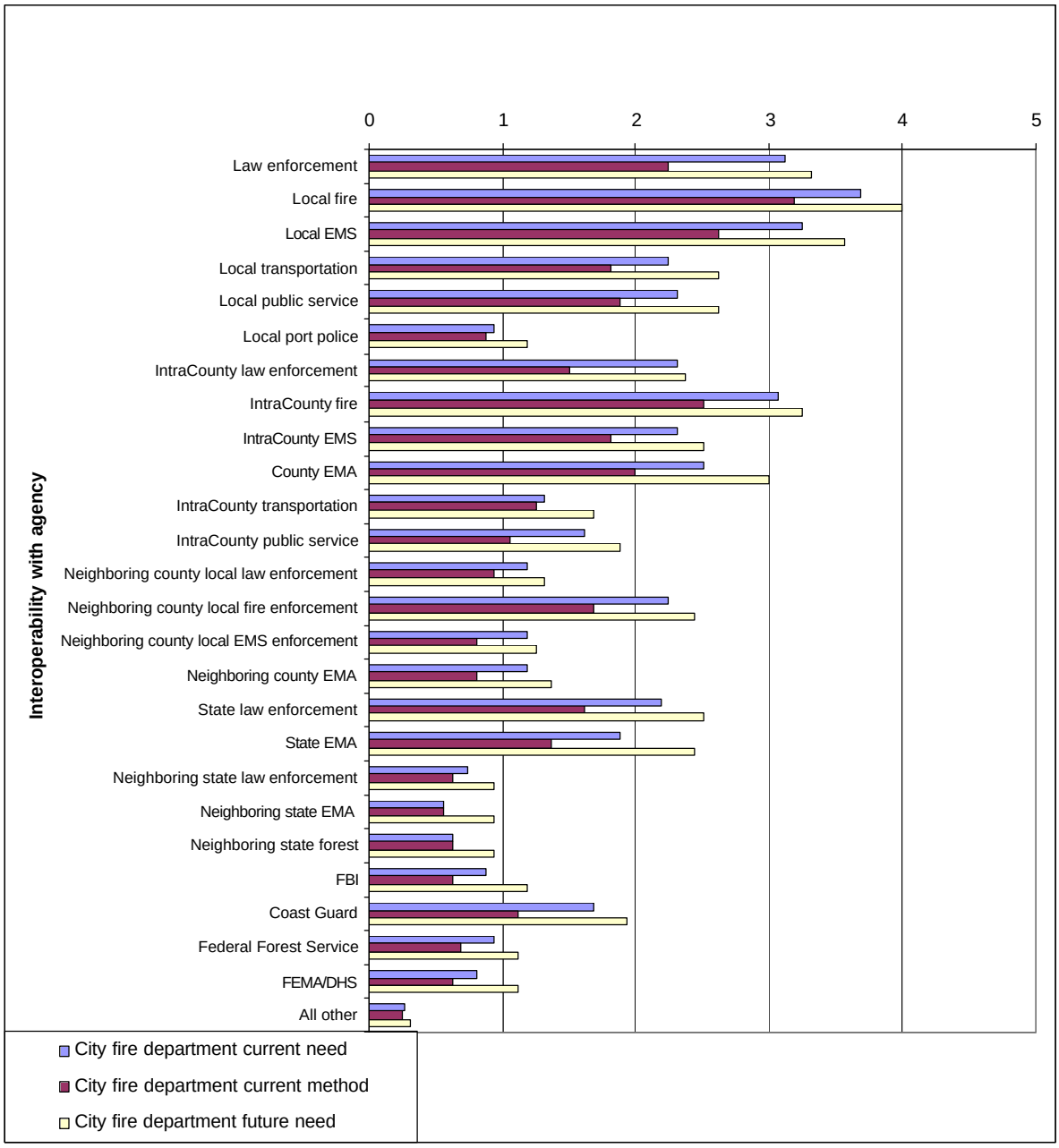


Figure 77 - City fire department interoperability with other agencies

2.5.5.6 Fire - volunteer fire district

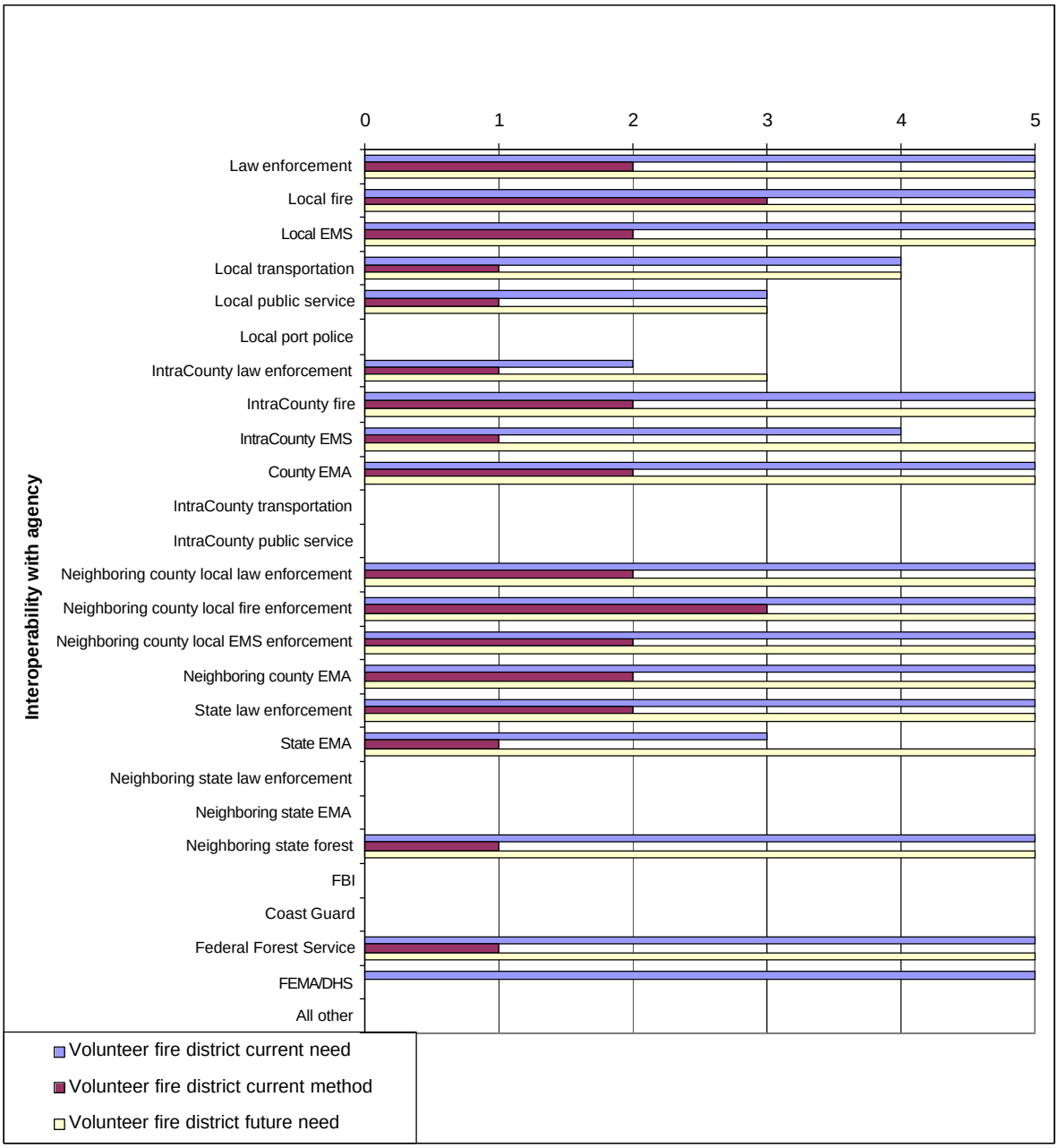


Figure 78 - Volunteer fire district interoperability with other agencies

2.5.5.7 Fire - county fire department/district

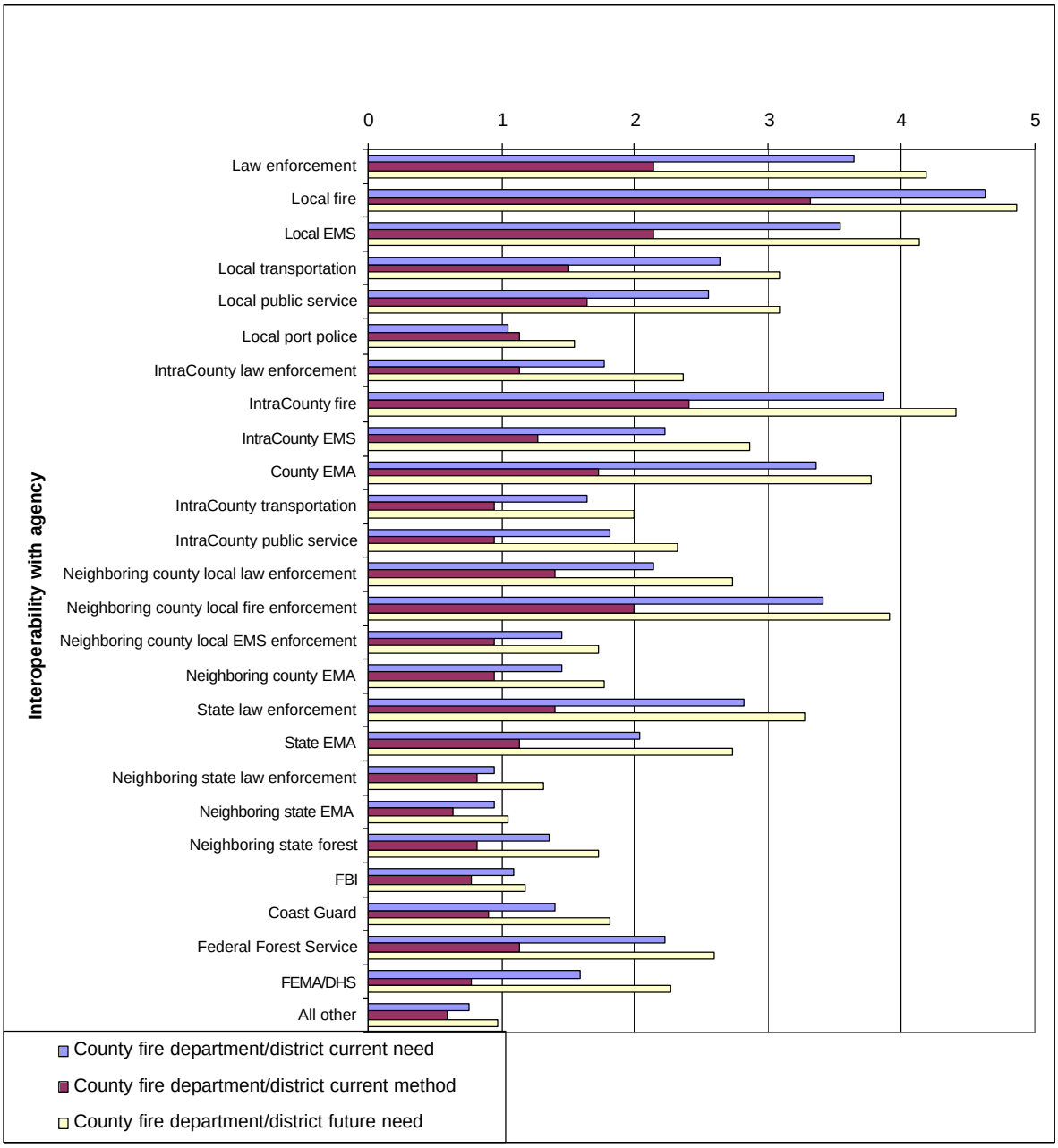


Figure 79 - County fire department/district interoperability with other agencies

2.5.5.8 Fire - fire protection district

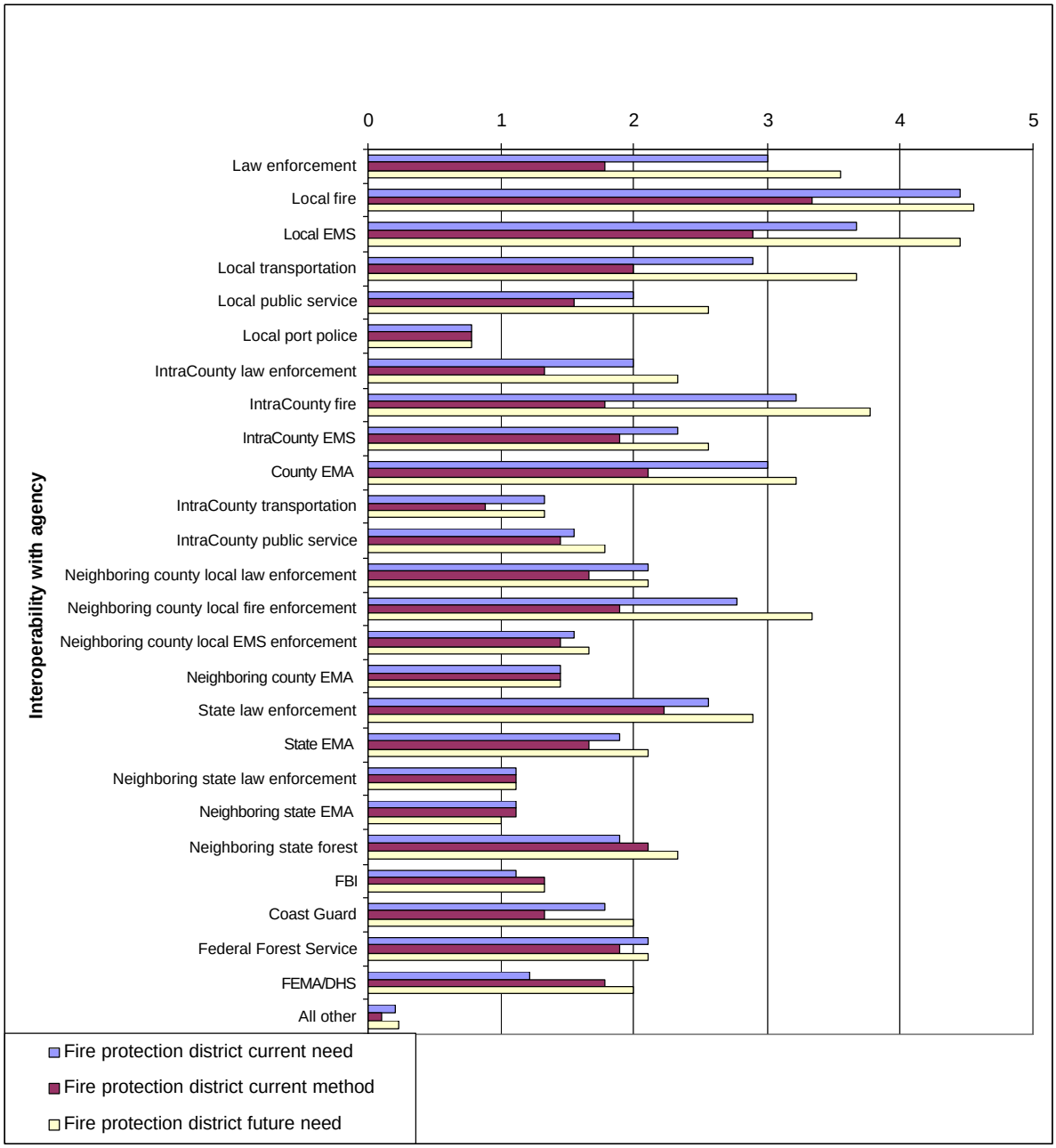


Figure 80 - Fire protection district interoperability with other agencies

2.5.5.9 EMS - government operated EMS

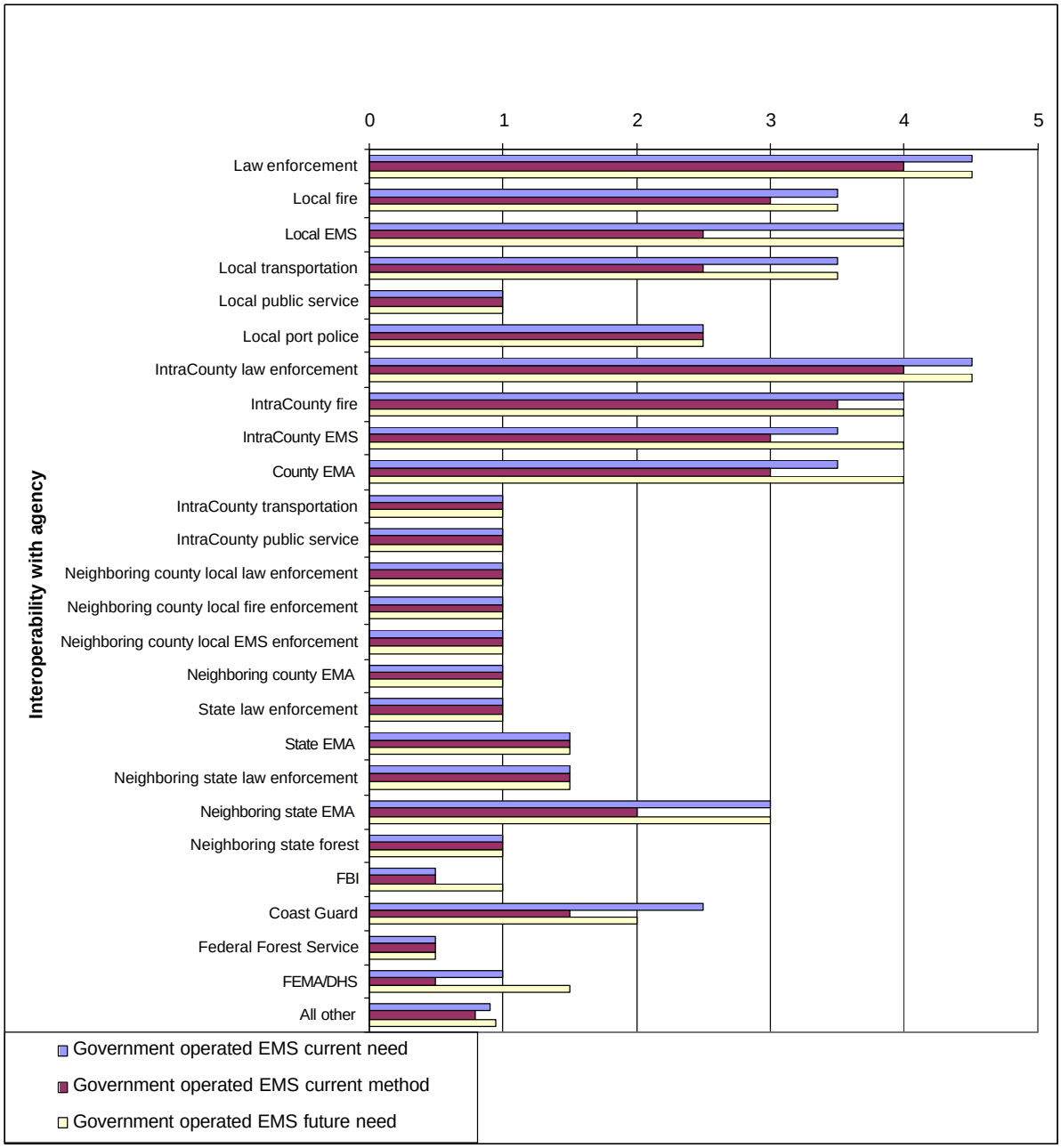


Figure 81 - Government operated EMS interoperability with other agencies

2.5.5.10 EMS - Non-government operated/private EMS

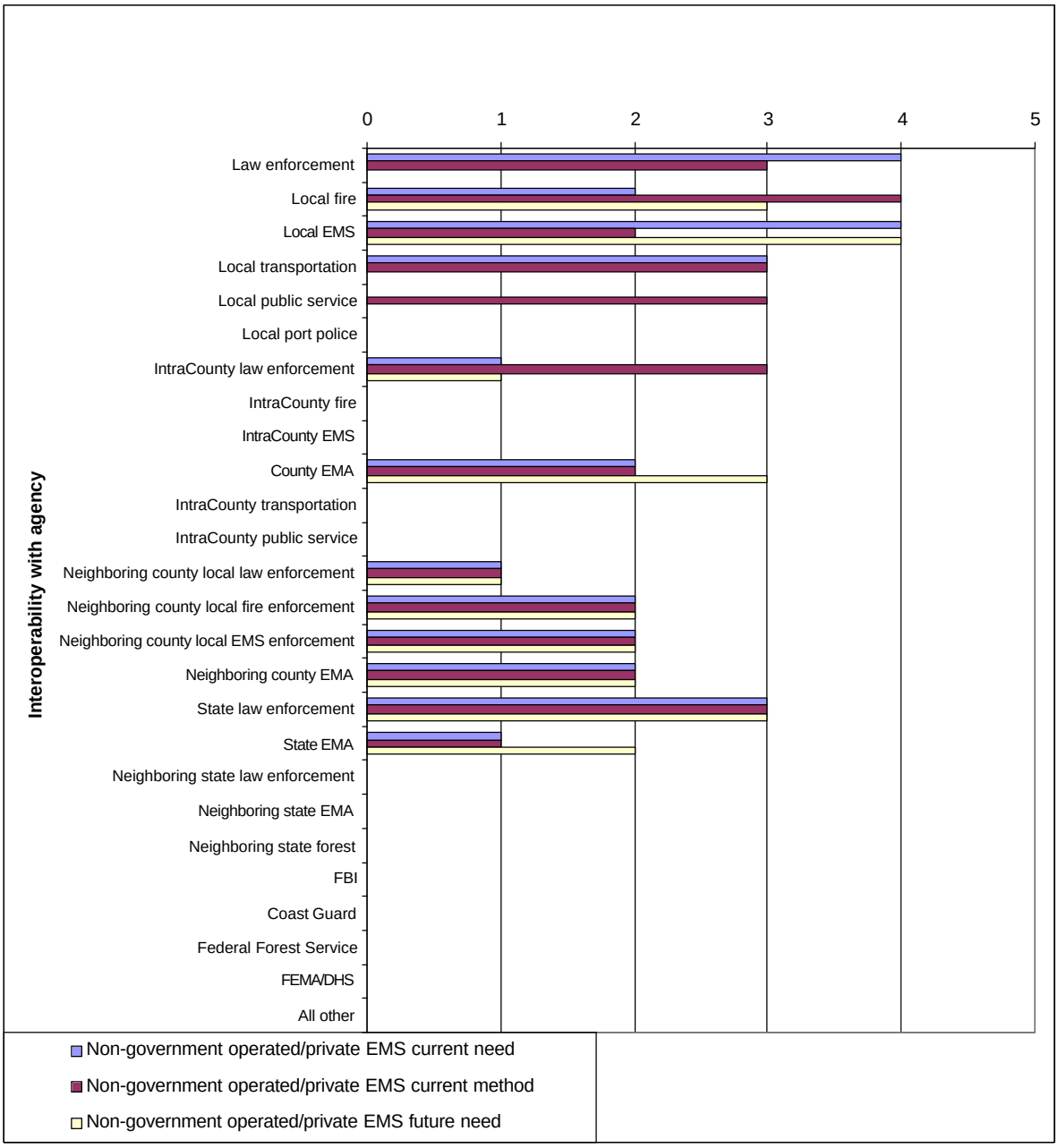


Figure 82 - Non-government operated/private EMS interoperability with other agencies

2.5.5.11 Other

The agencies that chose “other” to describe their agency mission were from a county and police dispatch center, Fish and Wildlife Management, a hospital, combined city and county fire district, county radio communications service, state corrections/probation and state public health.

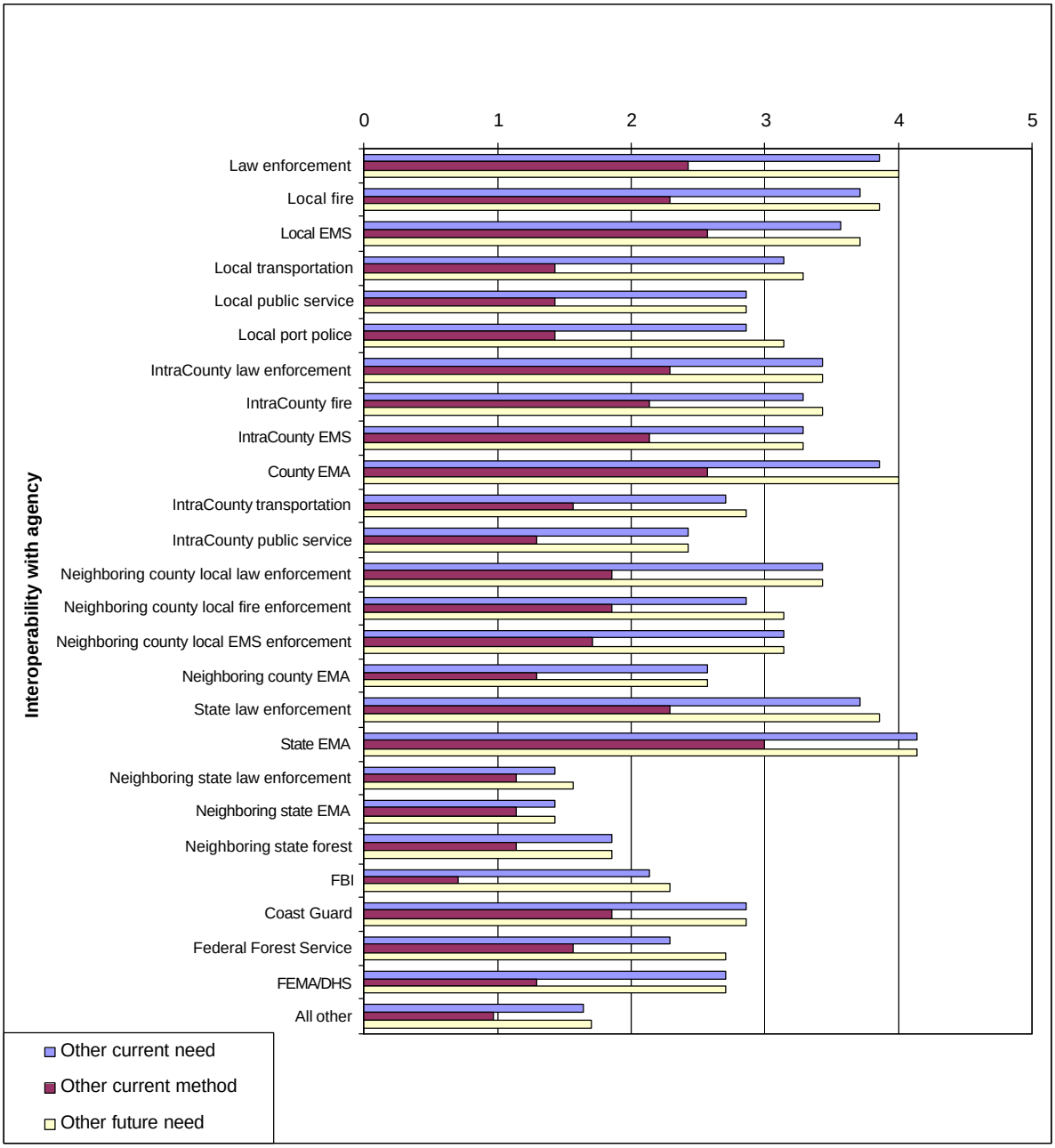


Figure 83 - Other agencies interoperability with other agencies

2.5.6 Other - emergency management center

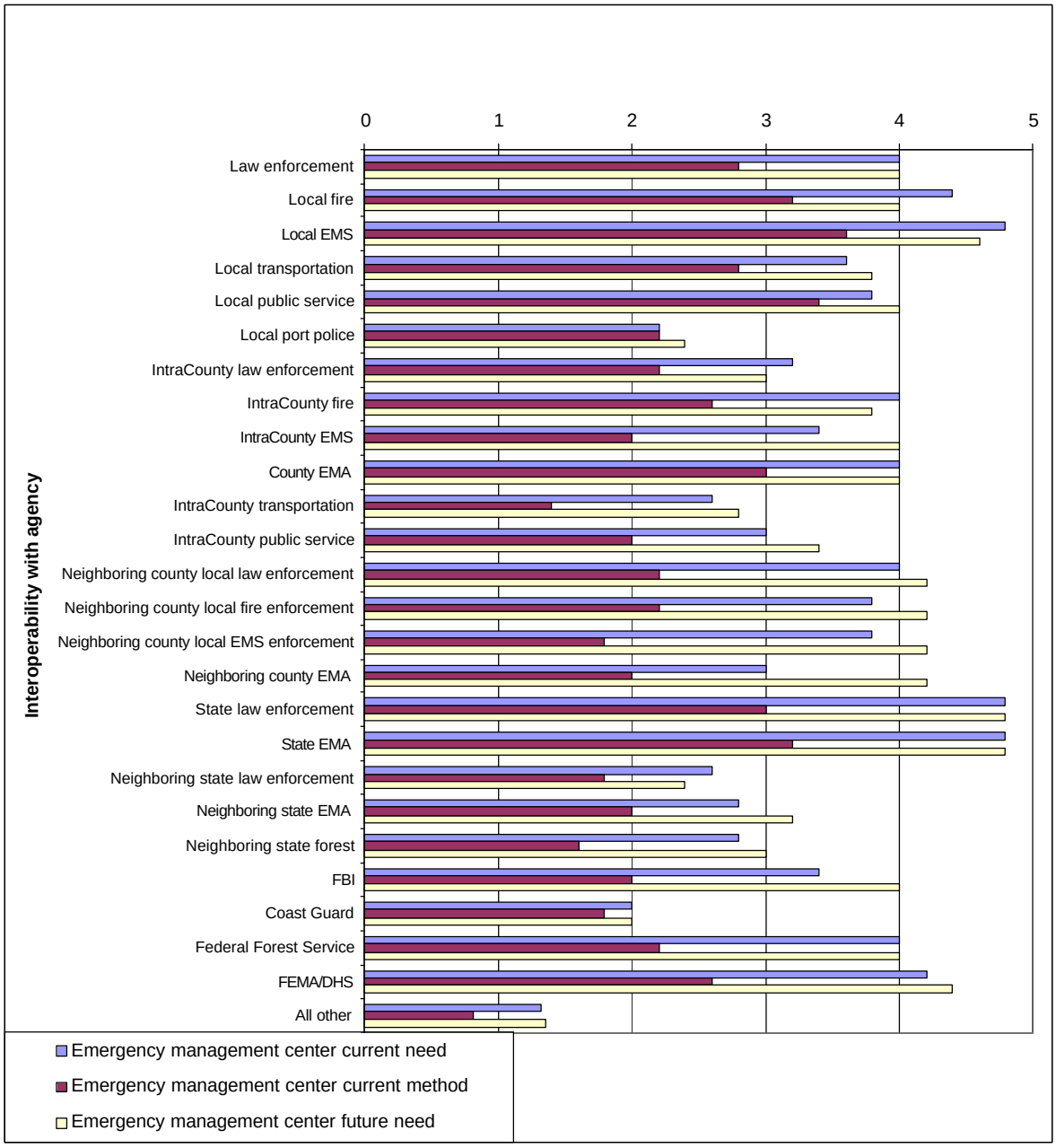


Figure 84 - Emergency management center interoperability with other agencies

2.5.6.1 Other - PSAP

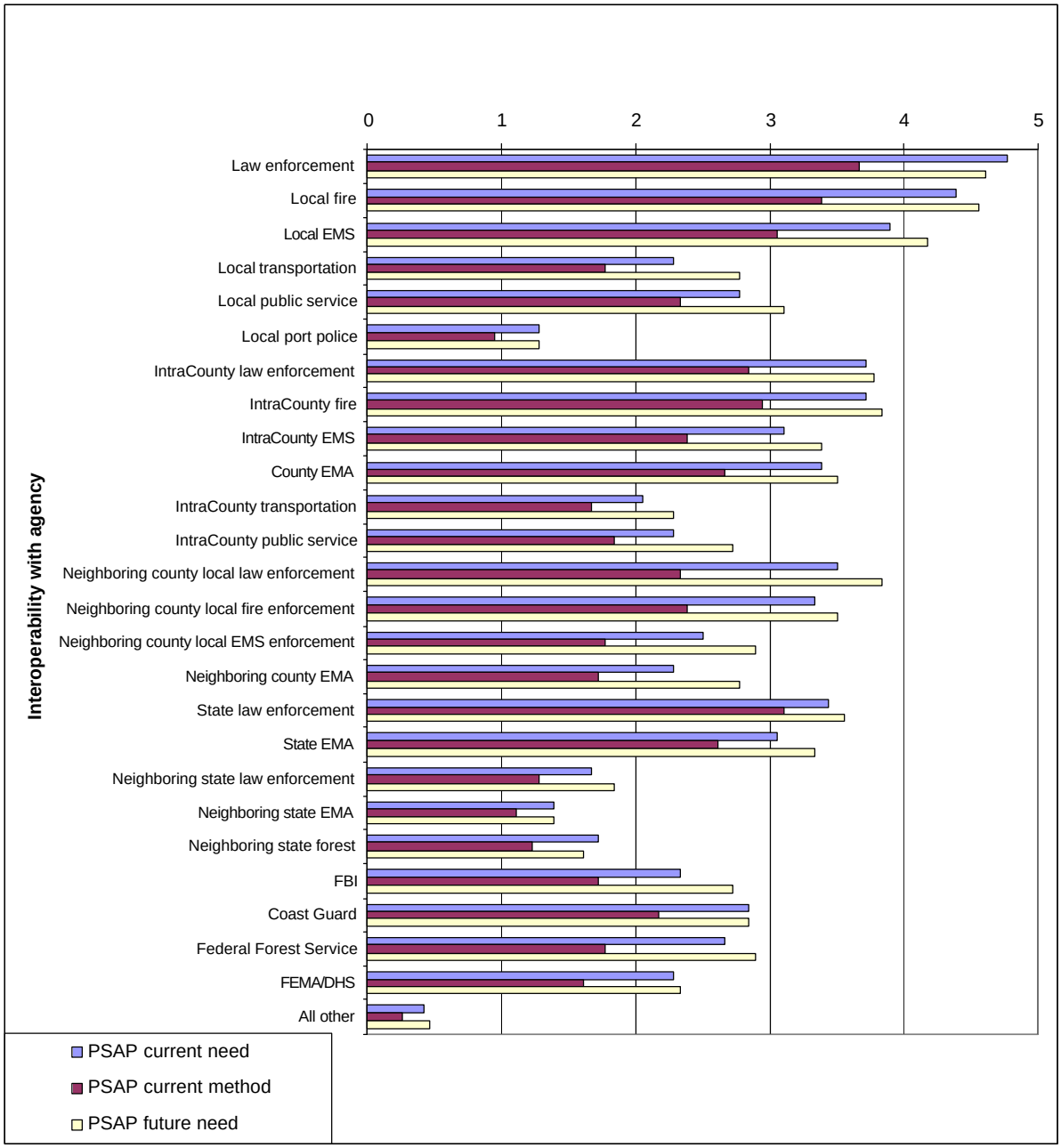


Figure 85 - PSAP interoperability with other agencies

2.5.6.2 Other - public services

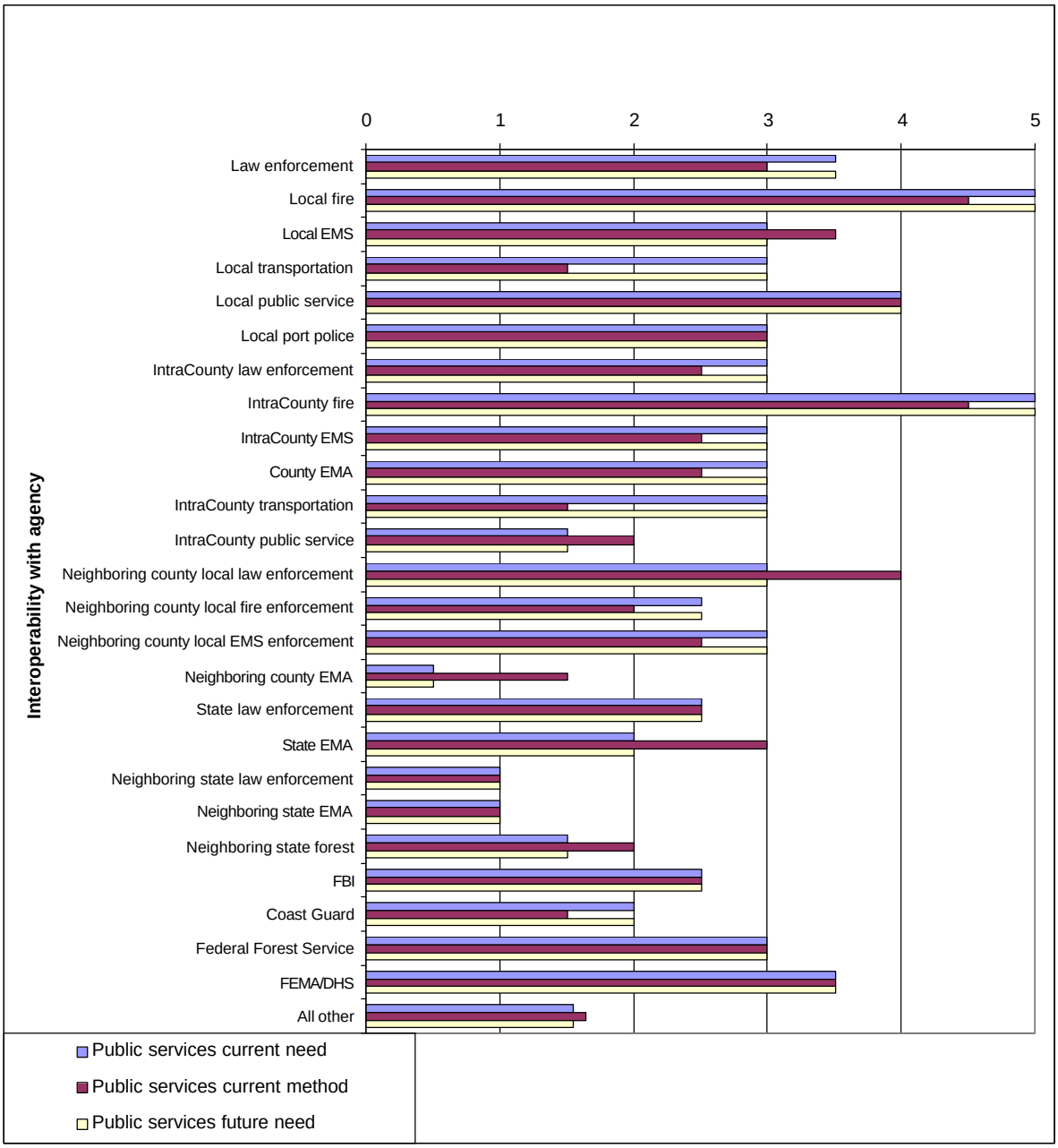


Figure 86 - Public services interoperability with other agencies

2.5.6.3 Other - public utilities

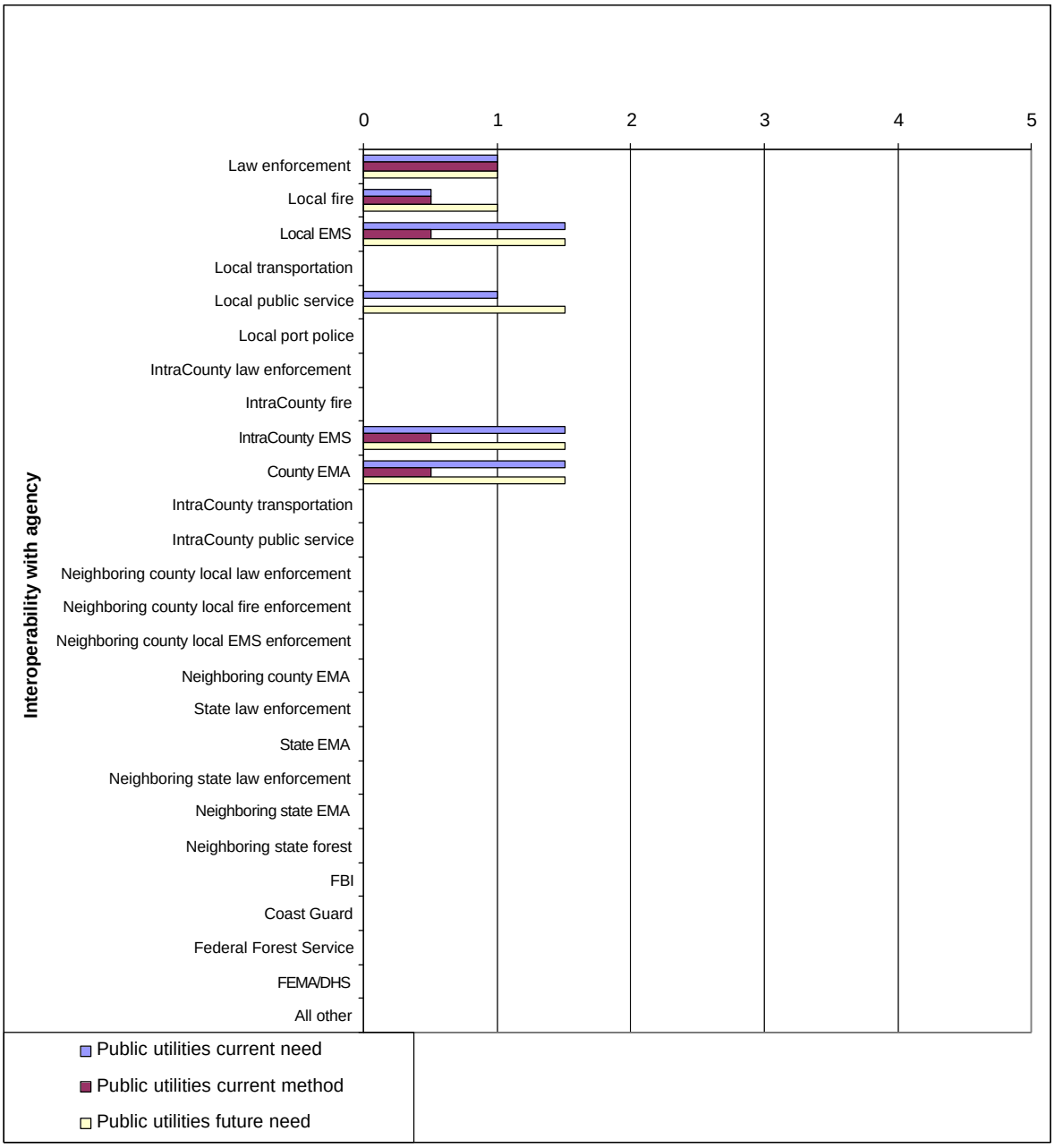


Figure 87 - Public utilities interoperability with other agencies

2.5.6.4 Other - search and rescue

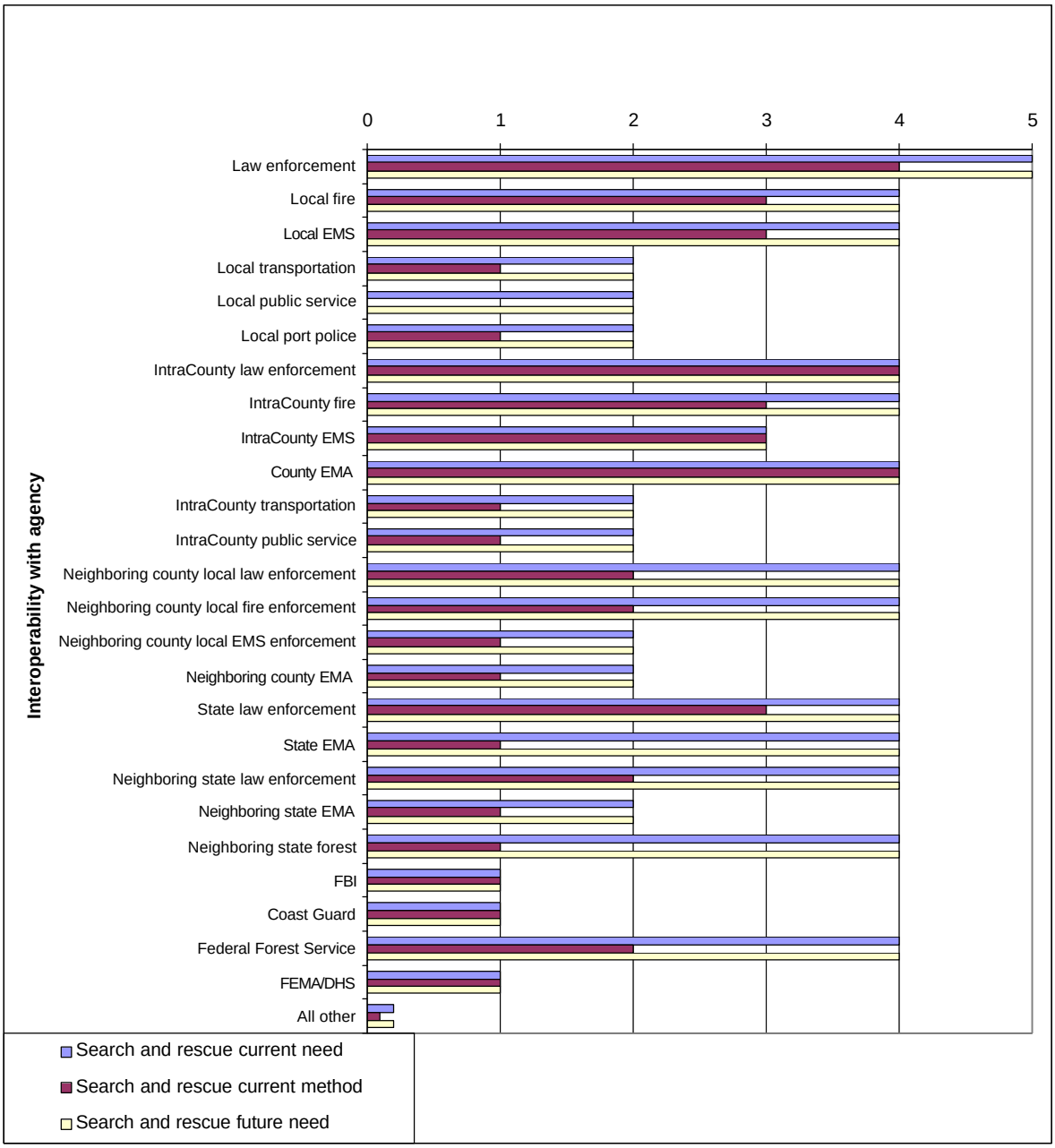


Figure 88 - Search and rescue interoperability with other agencies

2.5.7 VHF interoperability channels

The Federal Communications Commission (FCC) allocated the frequencies within the 150-160 MHz bands for the purpose of nationwide interoperability. Under the FCC's Rules and Regulations, on January 1, 2005, the existing systems became secondary to use of the interoperability channels. Existing licensees may continue to operate on their frequencies adjacent to interoperability frequencies, but only on a secondary, non-interference basis to the interoperability frequencies.

The survey identified the 13 agencies that may be impacted by the January 1, 2005 date. Based upon this information, SIEC staff notified each of the potentially impacted agencies to implement mitigation processes.

2.6 Technical - systems information

This section contains figures that identify the level of need and the level of satisfaction for various capabilities. In all cases, the scale for these ratings is based on 1 being a low need/satisfaction and 5 being a high need/satisfaction.

2.6.1 Introduction

Data from the system section of the study came from 141 responders who answered at least one question in the section. Each response is treated equally. The makeup of the responders using the “agency mission” category is shown in Table 15.

Responding agency	Responses
EMS - government-operated EMS	2
EMS - non-government operated/private EMS	1
Fire - city fire department	17
Fire - county fire department/district	24
Fire - fire protection district	8
Fire - industrial fire district	1
Fire - volunteer fire district	1
Law enforcement - county jail	1
Law enforcement - police department	38
Law enforcement - sheriff's office	17
Law enforcement - tribal police department	2
Other - emergency management center	6
Other - PSAP	17
Other - public services	2
Other - public utilities	2
Other - search and rescue	1
Other - transportation	1
Other	7

Table 15 - Source of data - system information

2.6.2 System capacity

Satisfaction with system operation involves several factors, including current capacity, ease of operation and coverage. Of those who responded, 23 percent said system capacity was inadequate (1 or 2 rating), 50 percent said it was adequate (3 rating), and 33 percent rated capacity as good to excellent (4 or 5 rating).

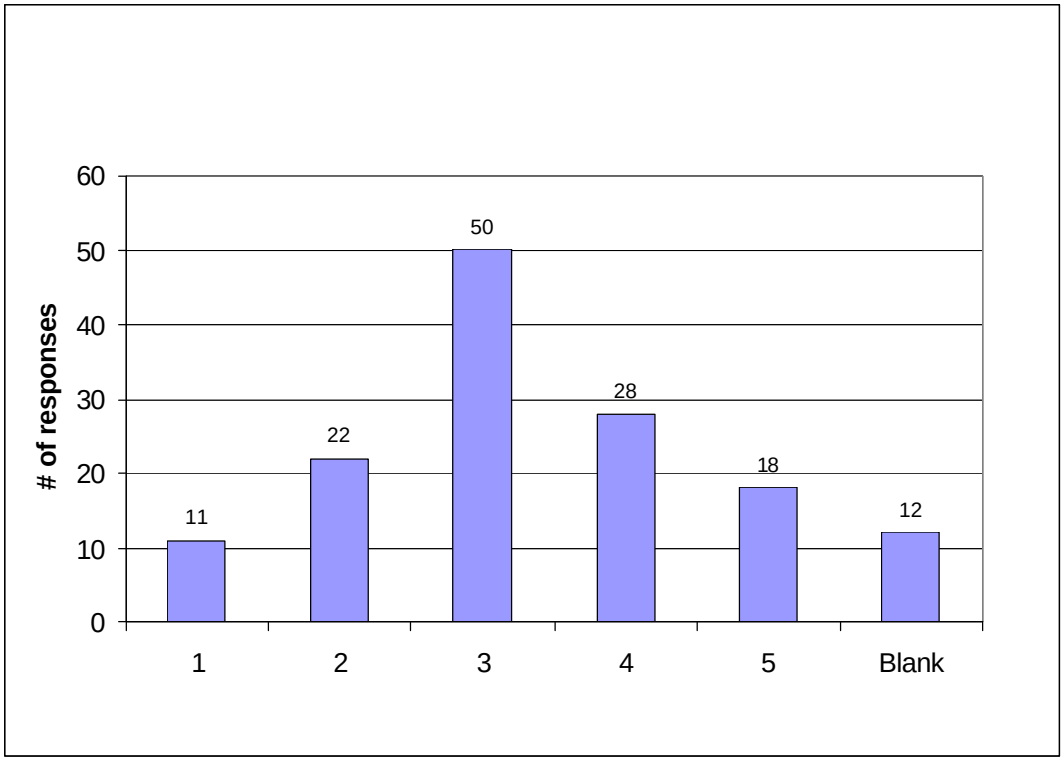


Figure 89 - Satisfaction with system capacity

Responders were asked to list any events that would cause significant changes in their system capacity. The events listed are:

- fires
- natural disasters
- weather
- simultaneous events

The survey asked whether the responders' system had sufficient capacity to meet requirements of these types of events. Among the responders, 56 percent said their system lacked sufficient capacity for these events.

2.6.3 System coverage

The survey indicates that the majority of the responders' radio systems meet their mobile radio coverage expectations; however, fewer responders were as satisfied with portable radio coverage. The figures that cover satisfaction are based on a rating scale of 1 as low satisfaction and 5 as high satisfaction.

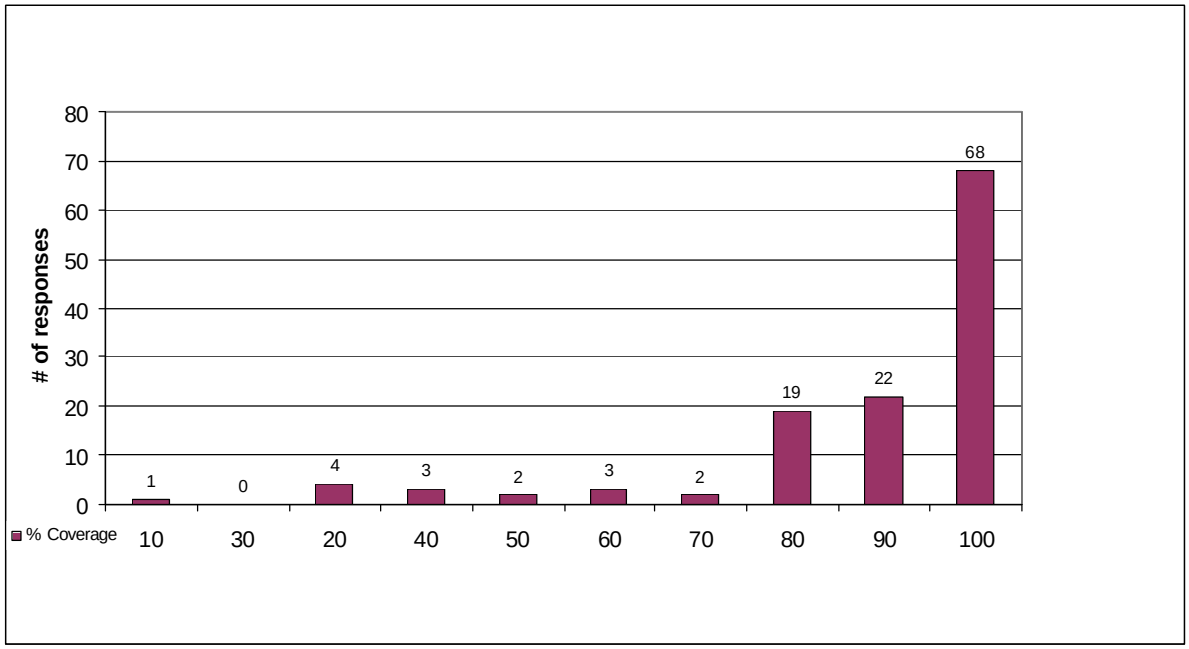


Figure 90 - Mobile coverage in agency's jurisdiction

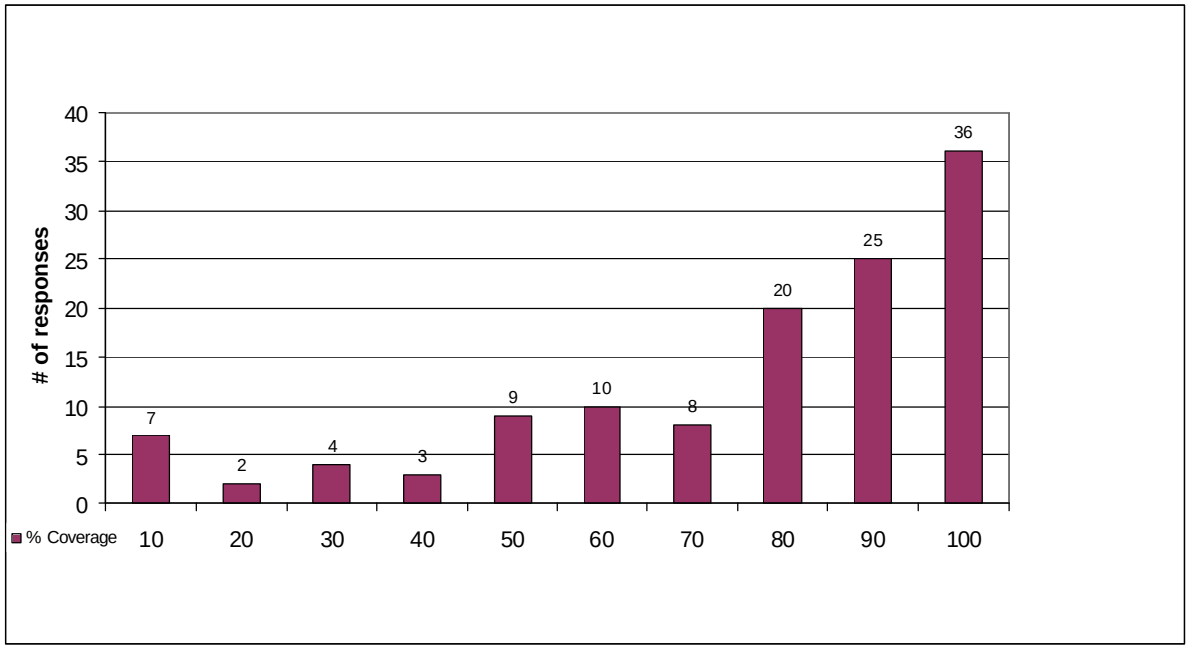


Figure 91 - Portable coverage in agency's jurisdiction

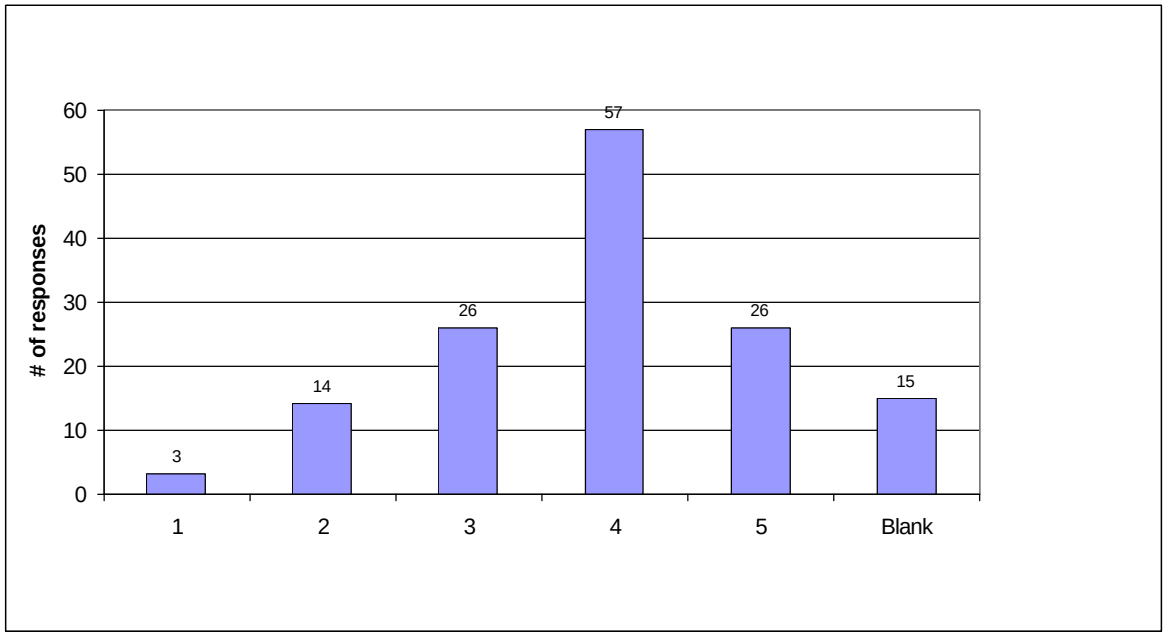


Figure 92 - Satisfaction with mobile coverage

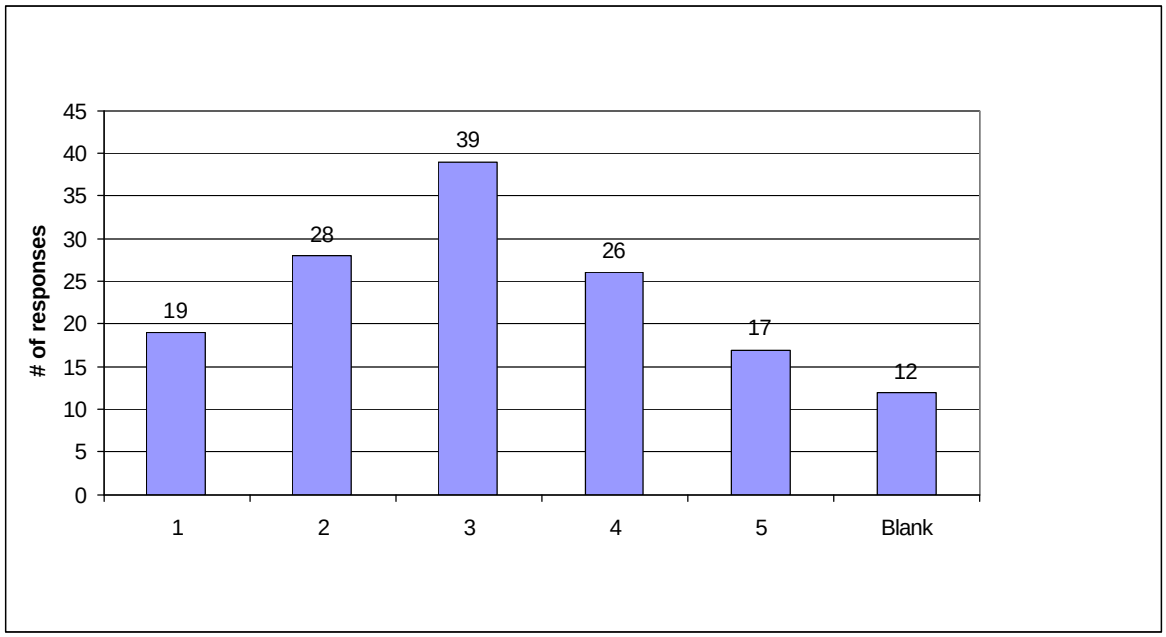


Figure 93 - Satisfaction with portable coverage

2.6.4 System functionality

Responders were asked to rate several system features as to their current use, current need and need over the next two to five years. The current use is indicated in the text for each category, and current and future needs are shown by an associated bar chart. Greater need is rated a 4 or 5, while lesser need is rated a 1 or 2. See Figures 94-106.

2.6.4.1 Statewide roaming

Regional and statewide agencies have been shown separately in this category due to this unique requirement for statewide roaming for state agencies. These questions were scored on a scale of 1 to 5, with 5 being a very great need.

Statewide roaming is used by 8 percent of all responders. Twelve percent of the responders indicated that it is a great current need (rating of 4 or 5). All responders indicated, however, that the future need is greater than the current need.

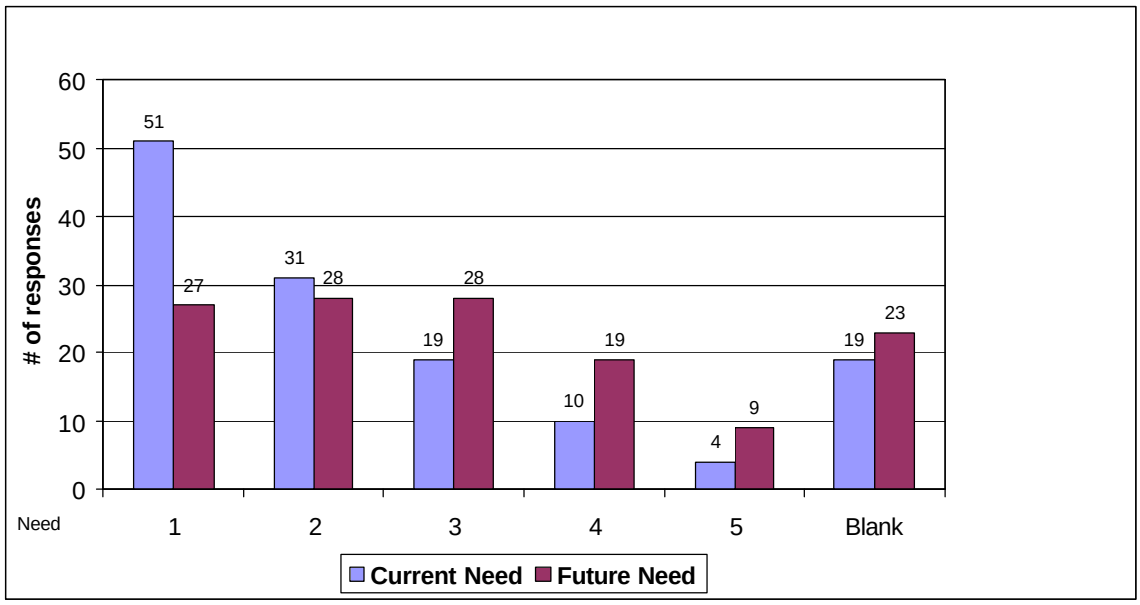


Figure 94 - Need for statewide roaming by Homeland Security regions

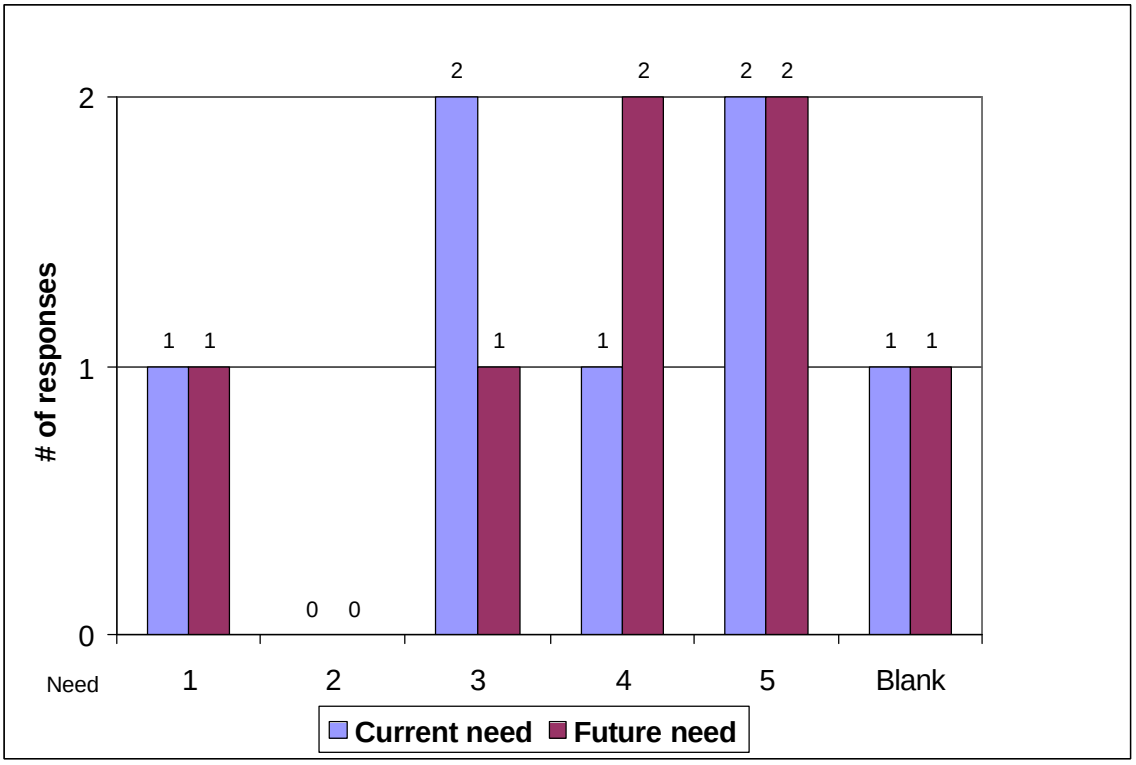


Figure 95 - Need for statewide roaming by state agencies

2.6.5 Automatic vehicle location (AVL)

AVL is currently used by 3 percent of the responders. Twenty-one percent of the responders rated the current need as high (4 or 5). Forty-two percent of the responders rated the future need as high.

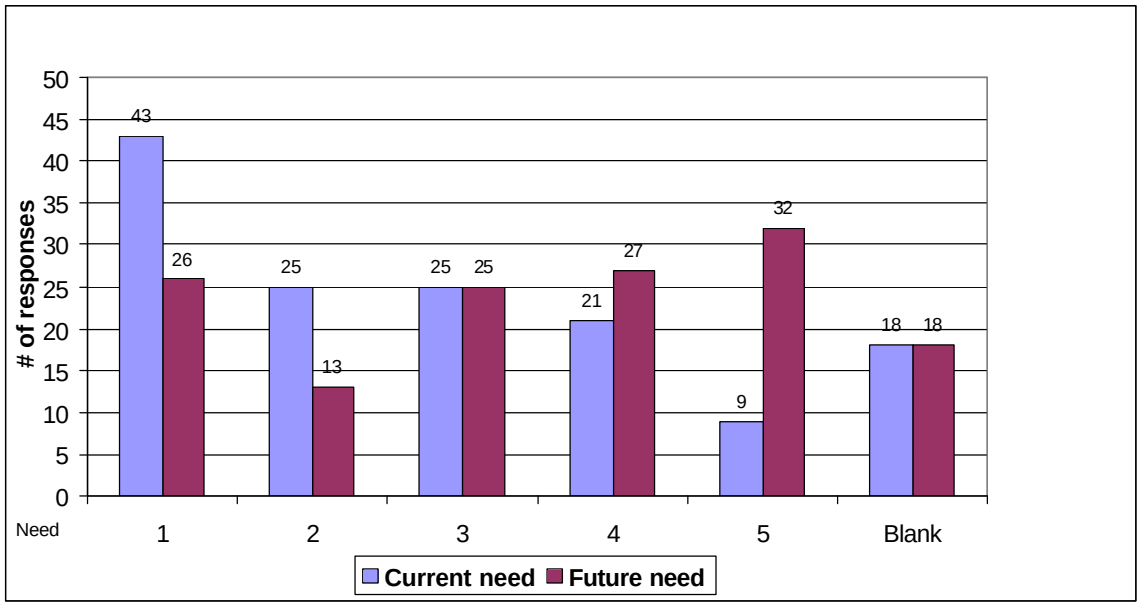


Figure 96 - Need for AVL

2.6.6 Card/drivers license (DL) swipe

Two percent of responders use a card/DL swipe. Sixteen percent of responders rated the current need as high (4 or 5). Twenty-eight percent of the responders rated the future need as high (4 or 5). It is likely that this need will increase as more drivers' licenses get the capability of being swiped.

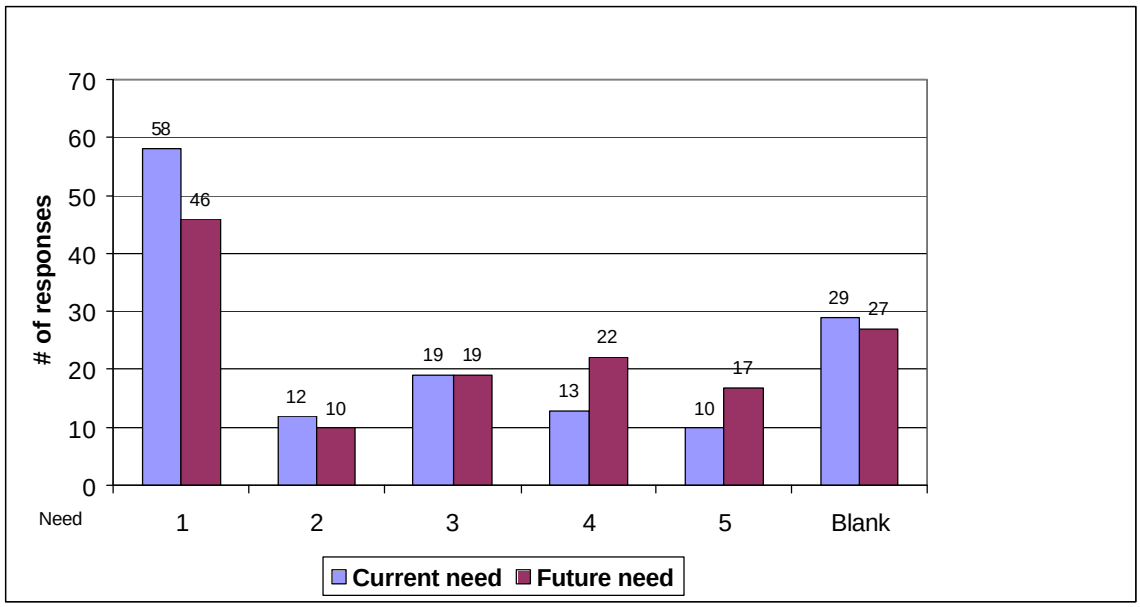


Figure 97 - Need for card/DL swipe

2.6.7 E-mail from vehicle

Sixteen percent of responders reported that they use e-mail from their vehicles. Twenty-one percent of responders rated the current need as high (4 or 5). Forty-one percent of respondents rated the future need as high (4 or 5).

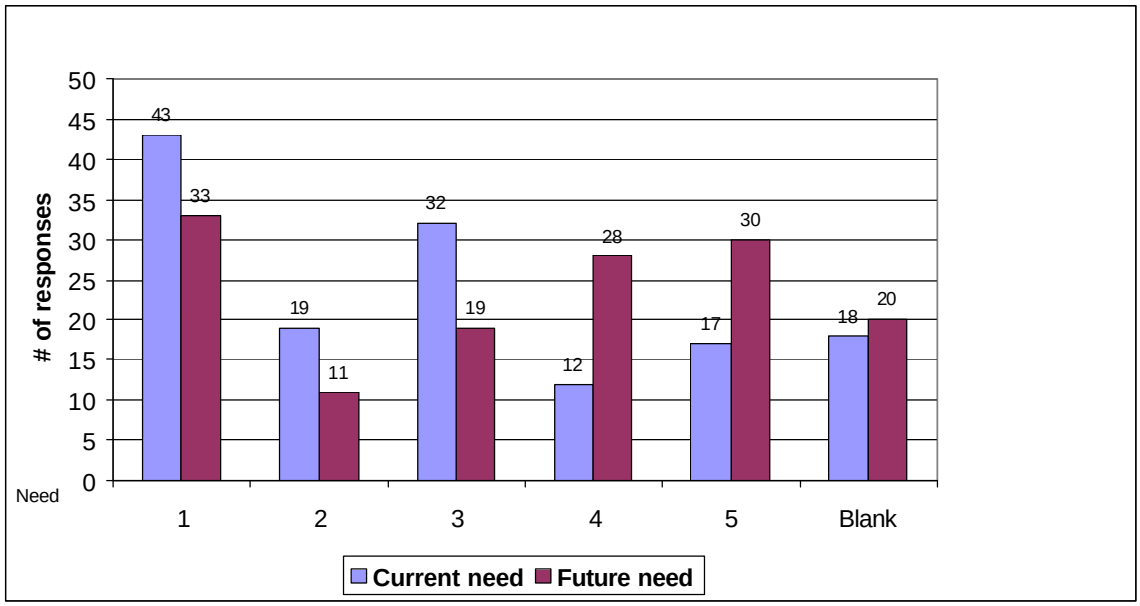


Figure 98 - Need for e-mail from vehicle

2.6.8 Subscriber identification (ID)

Thirteen percent of responders employ subscriber ID. Eighteen percent of responders rated the current need as high (4 or 5), and 22 percent rated the future need as high (4 or 5).

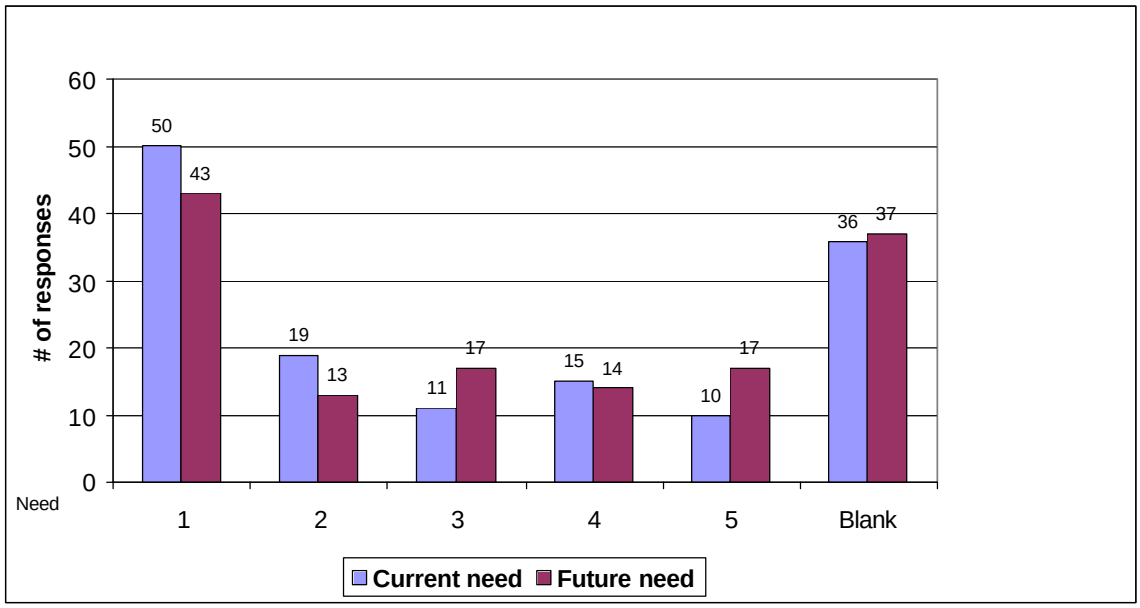


Figure 99 - Need for subscriber ID

2.6.9 Mobile printing

Only 4 percent of responders indicated the use of mobile printing. Twelve percent of the responders rated the current need as high (4 or 5), and 40 percent of the responders rated the future need as high (4 or 5). With the anticipated roll-out of an e-citation, it is expected that this function also will see an increase in need.

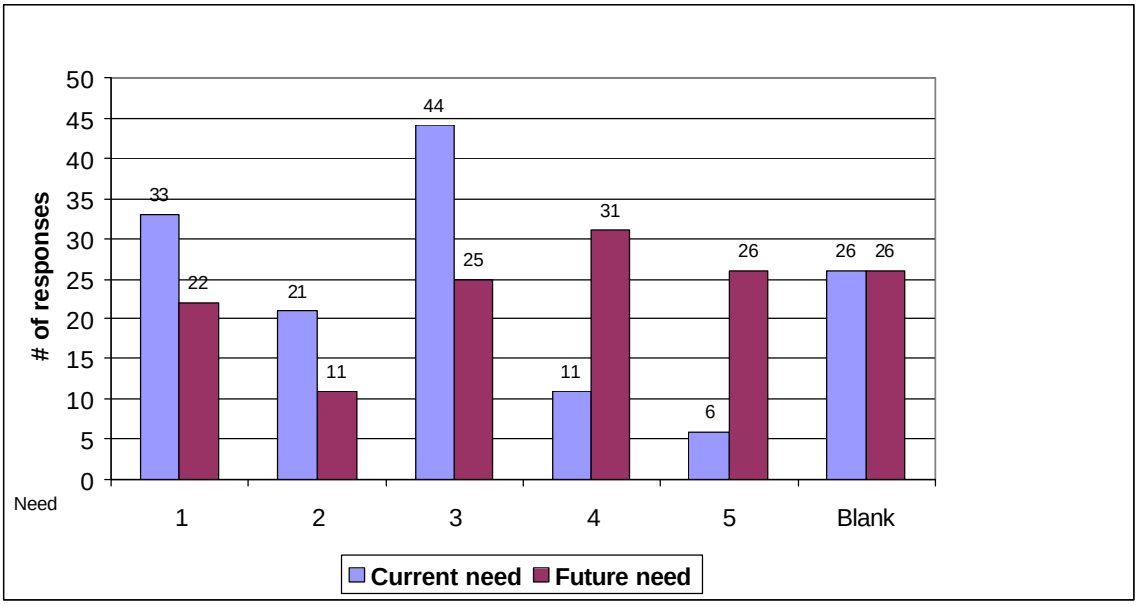


Figure 100 - Need for mobile printing

2.6.10 Mobile video

Fifteen percent of responders use mobile video today. Twenty percent of responders rated the current need as high (4 or 5) and 35 percent rated the future need as high (4 or 5).

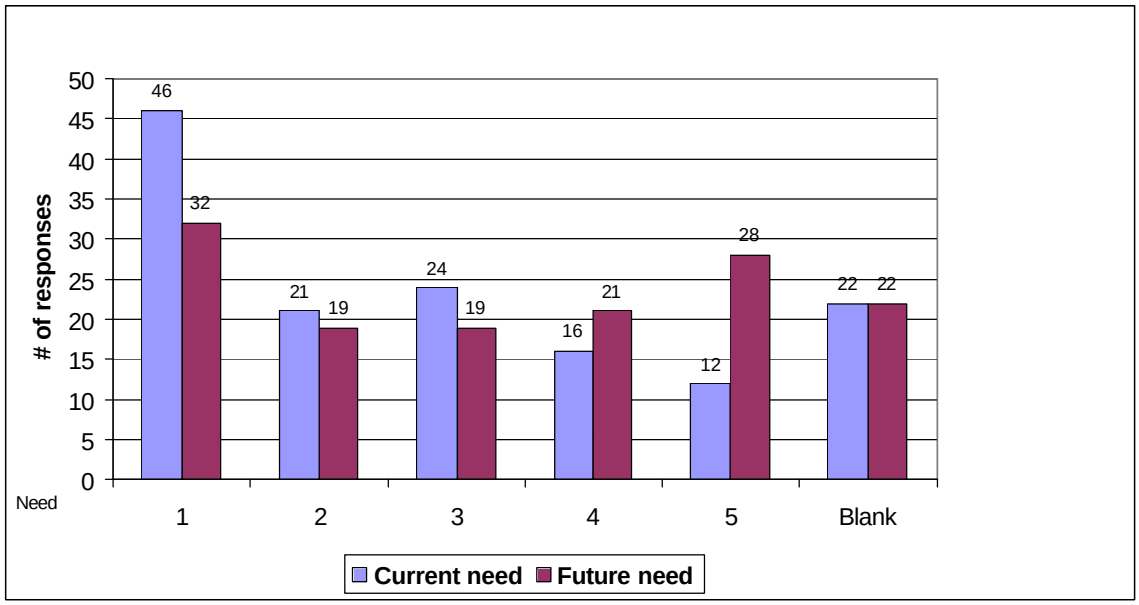


Figure 101 - Need for mobile video

2.6.11 Mobile voicemail

Seventeen percent of responders reported using mobile voicemail. Sixteen percent of the responders rated the current need as high (4 or 5) and 26 percent rated the future need as high (4 or 5).

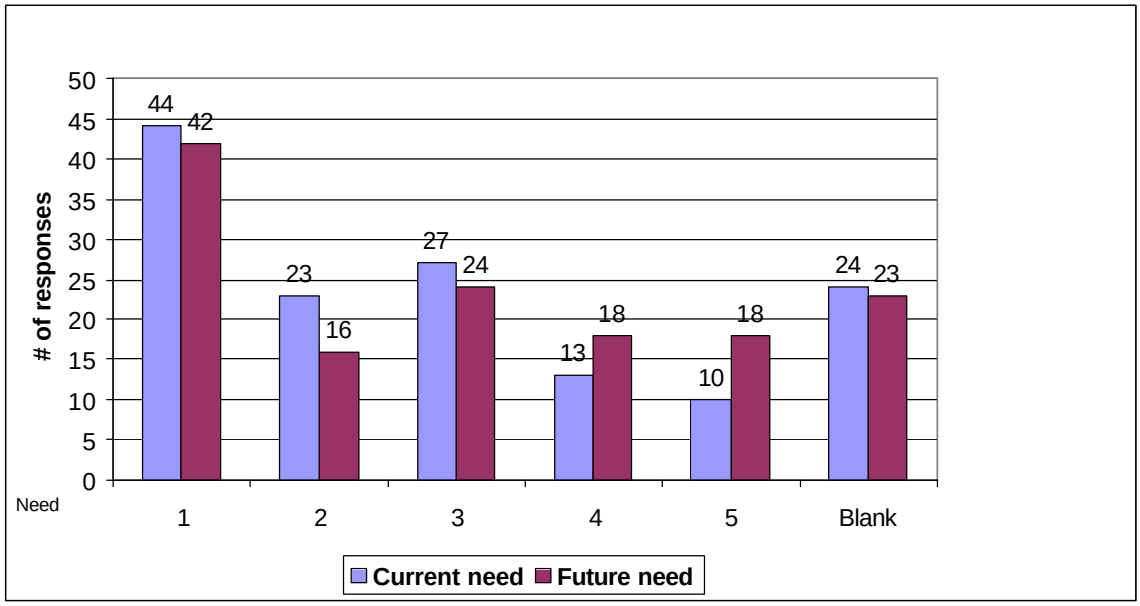


Figure 102 - Need for mobile voicemail

2.6.12 Paging

Seventy-two percent of responders said they use paging. Sixty percent of the responders rated the current need as high (4 or 5) and 66 percent rated the future need as high (4 or 5).

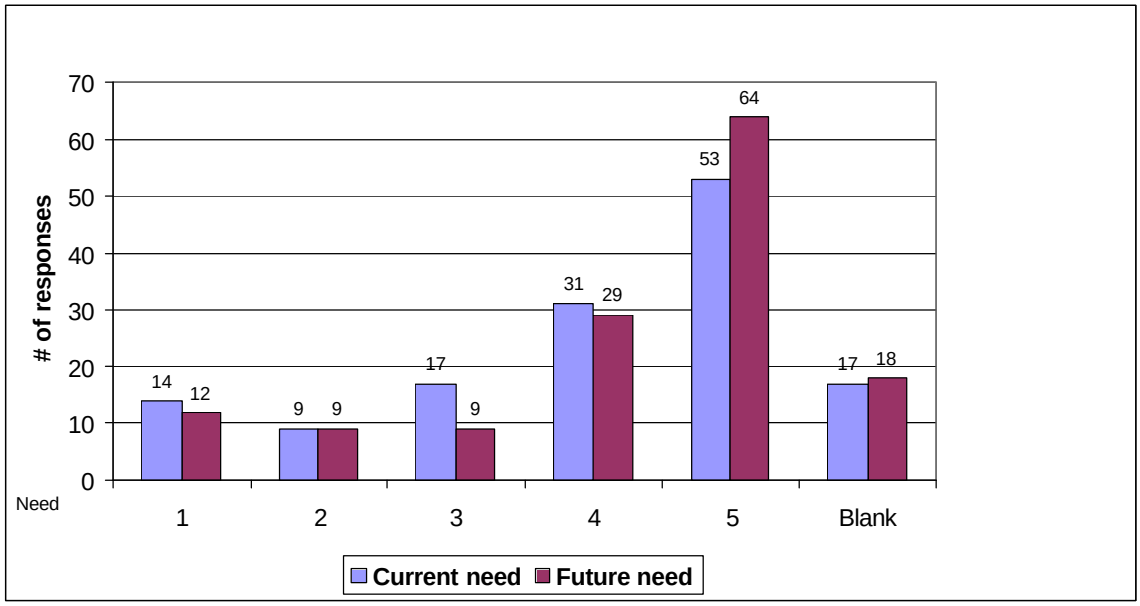


Figure 103 - Need for paging

2.6.13 Encryption

Thirteen percent of responders indicated they use encryption. Twenty-seven percent of the responders rated the current need as high (4 or 5) and 43 percent rated the future need as high (4 or 5).

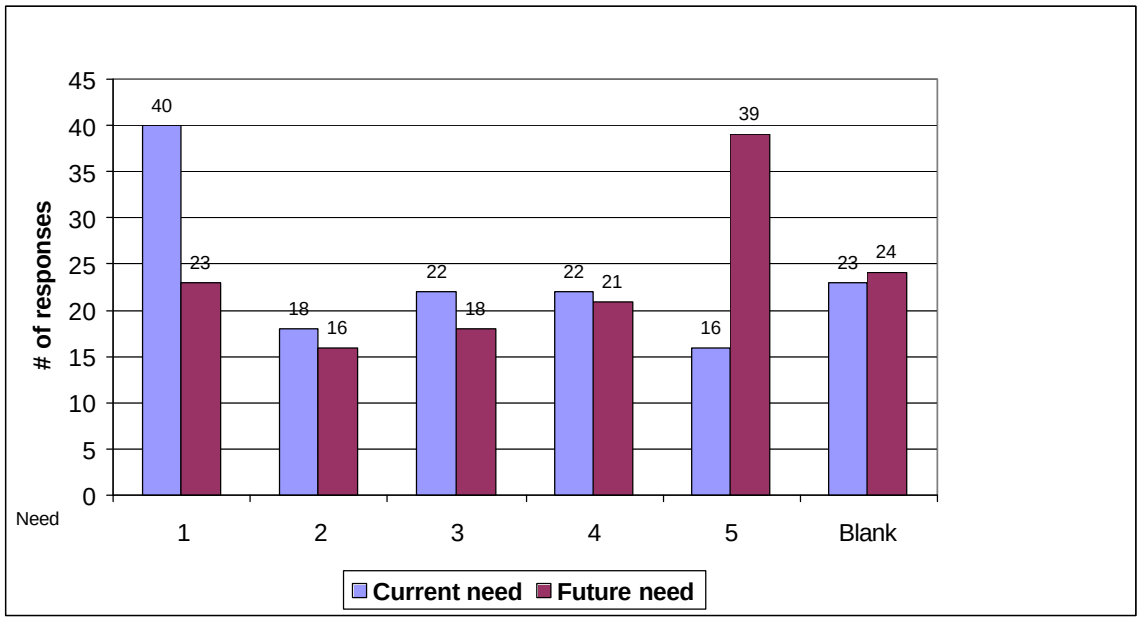


Figure 104 - Need for encryption

2.6.14 Voice recording

Thirty-four percent of responders indicated the use of voice recording. Thirty-seven percent of the responders rated the current need as high (4 or 5) and 47 percent rated the future need as high (4 or 5).

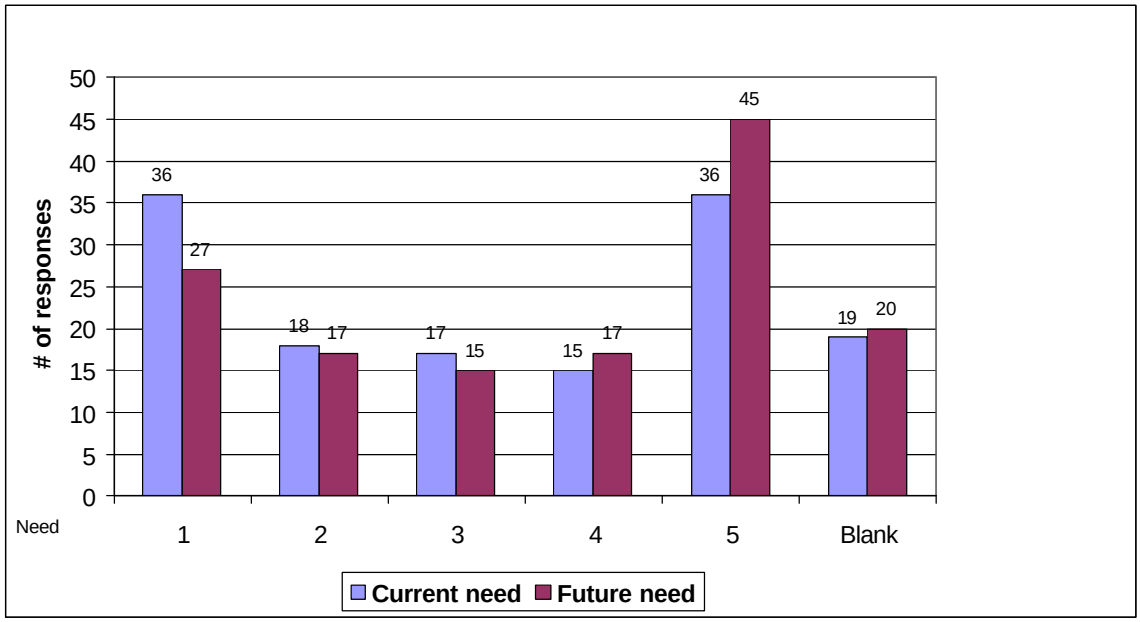


Figure 105 - Need for voice recording

2.6.15 IP gateways

IP gateways can provide communications between various entities. Figure 106 indicates that there is a high interest among the responders in this technology, with 47 percent rating it as a high interest (4 or 5).

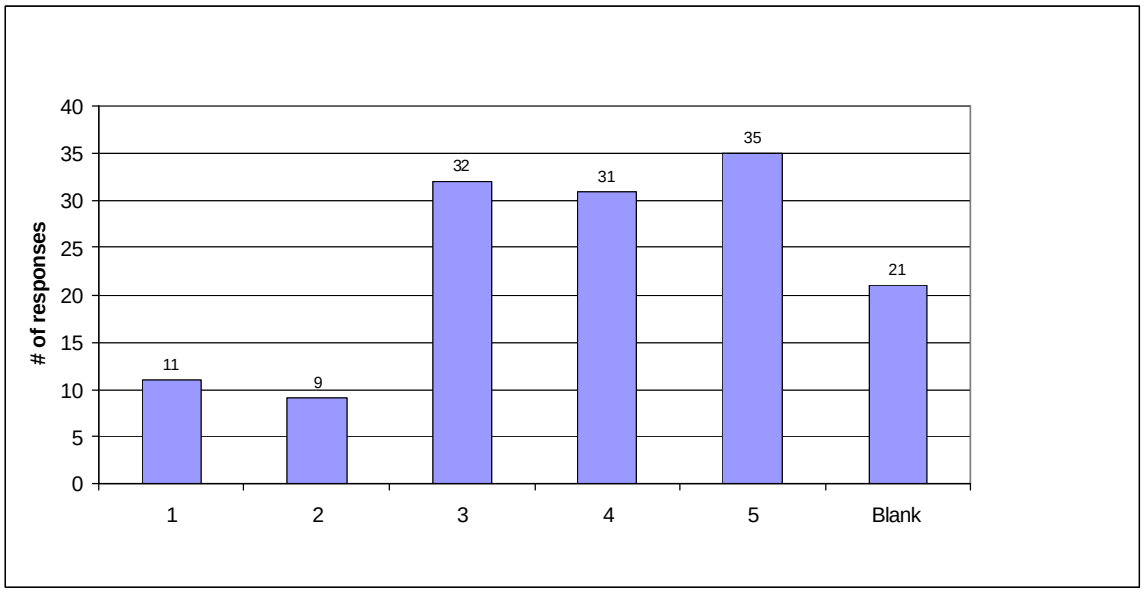


Figure 106 - Need for IP gateways

2.7 Technical - coverage maps

2.7.1 Parameters/assumptions used in the coverage analysis

The following parameters/assumptions were used in preparing the mobile talk-in coverage maps with 95 percent coverage reliability:

- A 25 kHz VHF analog signal type was used in the coverage maps for VHF tower sites.
- A 25 kHz wideband 800 MHz analog signal type was used in the coverage maps for 800 MHz tower sites.
- Omni directional 3dB gain antennas were used as a default antenna for every site. This allows comparison of the sites from the standpoint of the virtues of the terrain near the site. It is anticipated that in a final system design, directional antennas, different gain antennas, or antenna arrays would be used to achieve maximum coverage.
- The coverage analysis used a target “delivered audio quality” (DAQ) of 3.4.
- A 35 watt mobile unit was used for 800 MHz channels.
- A 100 watt mobile unit was used for VHF channels.
- A 3 dB antenna combining loss was used for antenna combining.
- Site latitude, longitude, elevation and tower height data was used from the survey.
- The antenna location is assumed to be at the top of the tower.

2.7.2 Survey data

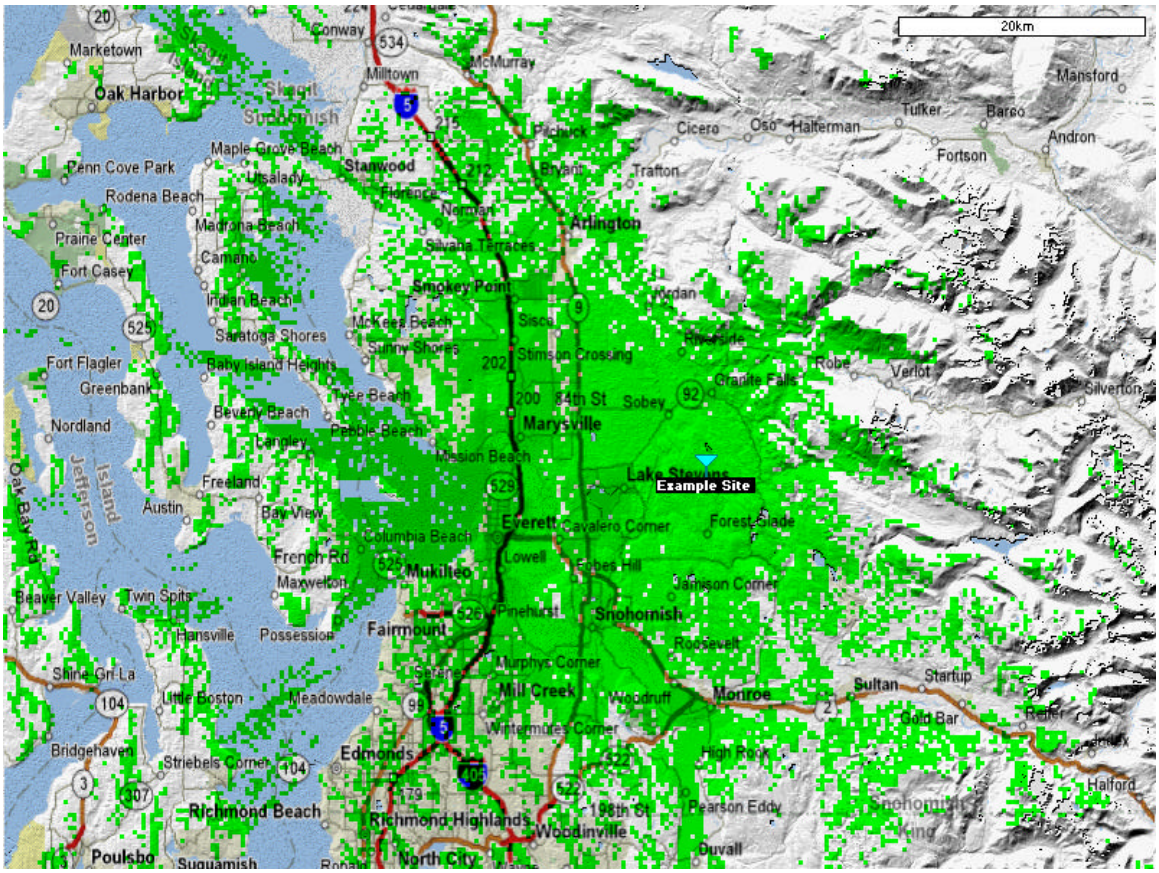
Many survey records entered latitude and longitude data incorrectly (typographical errors, reporting latitude as longitude and vice versa). Where possible the survey data was corrected and coverage maps generated.

2.7.3 Coverage map generation

For security purposes, the coverage maps will be delivered to the state in electronic form. Copies of these maps will not be included in this document and will be released only to authorized personnel.

2.7.4 Coverage map example

This is an example of what the coverage maps will look like. This is based on a fictitious tower location.



LEGEND

- State
- County
- Lake/Pond/Ocean
- Expressway
- Highway
- Connector
- Stream
- Military Area
- National Park
- Other Park
- City
- County

Green color represents 95 percent coverage reliability
Mobile talk-in coverage
60 percent foliage at 60'
3.4DAQ
Terrain data included
6dBM loss using 500' of 7/8" cable

2.8 Technical - conclusions

The following conclusions are drawn from the information provided in the technical sections of the survey:

- Tower information supplied from the survey shows that although some sites may provide the required facilities to build upon in the future, there is insufficient information available to make recommendations regarding the feasibility of specific sites.

- Tower and shelter condition appears to be good to excellent in most locations. Management of the areas requiring improvement will need to be handled on a per case basis.

- Responses to the survey indicated that pagers and cellular phones are utilized extensively across the state.

- Mobile data is used in several counties, with the majority of the mobile data units in Pierce County. The primary terminal manufacturer is Panasonic.

- Database and messaging are the most used applications on mobile data systems, but image, reporting and Web access use are planned in the future.

- The maximum number of transactions provided is questionable in a few responses, with maximum number achieving 10,000 per user. The state DOL, local RMS and local CAD have the highest number of transactions.

- Few agencies responding have their own dispatch capabilities. The majority use a centralized, shared dispatch facility with other public safety entities.

- About 10 percent of calls for service require a multi-agency or multi-jurisdictional response. Fire, vehicular accidents, medical emergencies, law enforcement and hazardous materials incidents top the list.

- When multi-agency or multi-jurisdictional events take place, the majority of responders indicated that communications can be accomplished between agencies but it requires the intervention of the dispatch center.

- Approximately 71 percent of the responders don't have a method to connect two or more agencies without a gateway device or intervention by dispatch. Crosspatch is considered effective by 55 percent of the responders while 15 percent believe it does not work.

- Responders reported that radio coverage with their systems was adequate to excellent. However, 56 percent of the responders reported that events such as fires, natural disasters, weather and simultaneous emergencies have a significant impact on system capacity.

- Mobile coverage satisfaction was reported to be above the median level, while portable coverage was slightly lower at the median level.

- Features that may not be currently in use but are needed both now and in the future include:
    - automatic vehicle location
    - mobile e-mail
    - mobile printing
    - paging
    - encryption
    - voice recording
    - mobile video

- Some features that may be needed in some agencies but not across the entire user community are:
    - statewide coverage
    - card/DL swipe
    - subscriber ID
    - mobile voicemail

2.9 Operational

2.9.1 Operational obstacles

Operational obstacles identified by all respondents are shown in Figure 107. The primary issues were all rated similarly and as such no single item emerges on which to focus. The “other” category contained items such as funding, technology and experience.

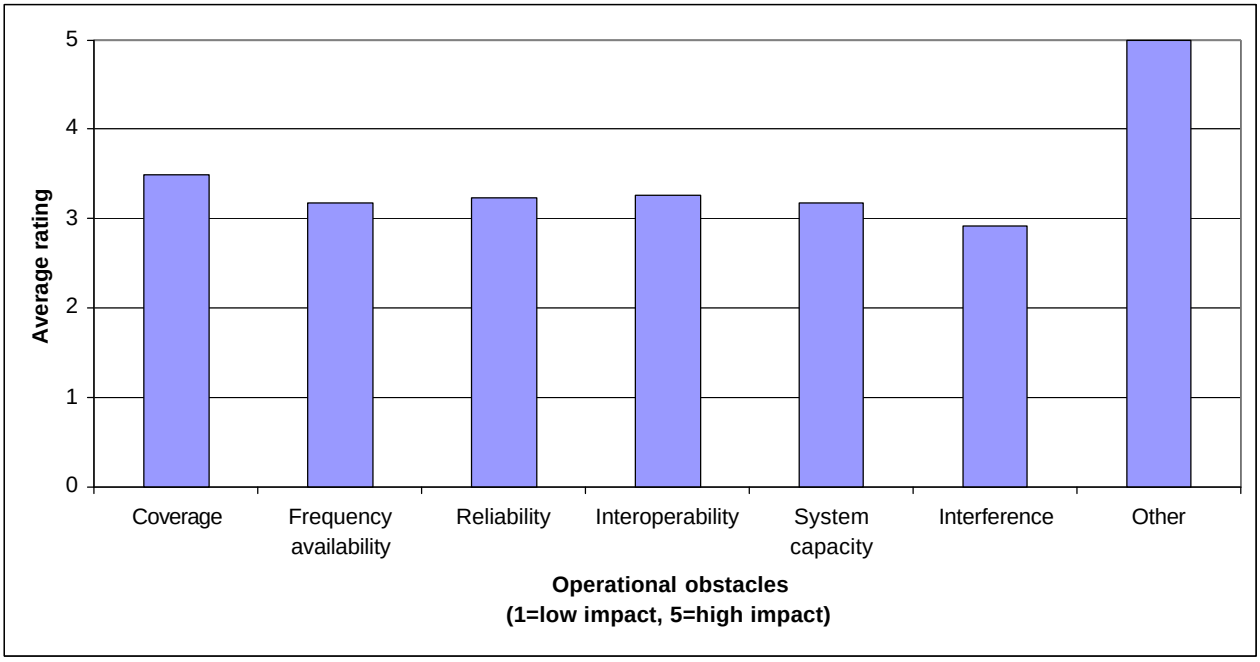


Figure 107 - Operational obstacles

The following was reported in the “other” operational obstacles and were rated as high (5).

- funding
- knowledgeable systems manager
- money
- need mobile data
- no interoperability with WSP
- tower/repeater failure
- vehicle to vehicle communication over five miles away

2.9.2 Incident communications

The survey asked what type of incident communications planning template was used for multi-agency responses. The response from each agency was counted and totaled by county for each type listed.

	Homeland Security region								
Command Protocol	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Ad-hoc for each incident	4	3	4	3	1	1	4	2	11
Form 205 template	1			1			1	1	
Isuite software	1								
NIMS/ICS template	14	5	14	5	3	5	10	8	2
Self developed template	1	1	3			3	1	1	1
STD ICS system			1						
Tribal council of fire chiefs								1	

Table 16 - Command protocols used by Homeland Security regions

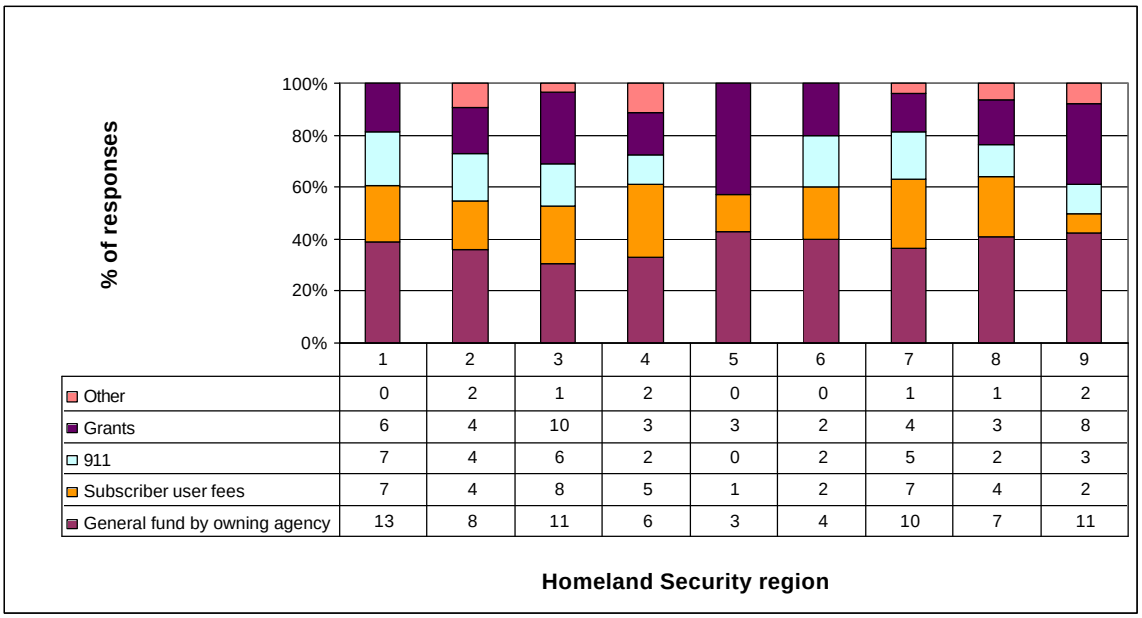
	State agency						
Command Protocol	**DOC**	**DFW**	**DOH**	**DNR**	**EMD**	**DOT**	**WSP**
Ad-hoc for each incident	1						
Form 205 template				1			
NIMS/ICS template		1		1	1		1
Self-developed template	1				1		

Table 17 - Command protocols used by state agencies

3 Funding

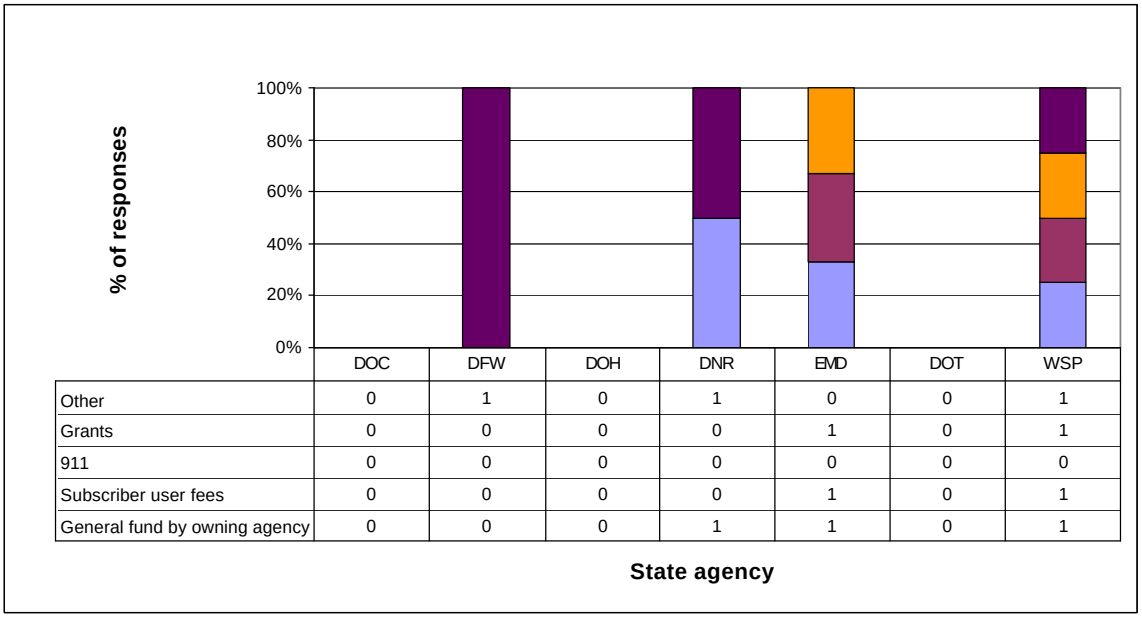
3.1 Cost recovery

The survey asked the responder to indicate the cost recovery methods for a system they have in planning. The sources are averaged by region in Figure 108 and by state agency in Figure 109.



	1	2	3	4	5	6	7	8	9
Other	0	2	1	2	0	0	1	1	2
Grants	6	4	10	3	3	2	4	3	8
911	7	4	6	2	0	2	5	2	3
Subscriber user fees	7	4	8	5	1	2	7	4	2
General fund by owning agency	13	8	11	6	3	4	10	7	11

Figure 108 - Cost recovery methods reported by Homeland Security regions



	DOC	DFW	DOH	DNR	EMD	DOT	WSP
Other	0	1	0	1	0	0	1
Grants	0	0	0	0	1	0	1
911	0	0	0	0	0	0	0
Subscriber user fees	0	0	0	0	1	0	1
General fund by owning agency	0	0	0	1	1	0	1

Figure 109 - Cost recovery methods reported by state agencies

3.2 Interoperability models

Responders were asked if their department or agency had an interoperability plan that may serve as a model. The agencies mentioned as a model for an interoperability plan are listed in Table 18.

• Benton County Emergency Services	• Law Enforcement Support Agency (LESA) Communications
• City of Everett Fire Department	• Lincoln County Sheriff's Office
• City of Lynnwood Fire Department	• Montesano Fire Department
• City of Tacoma	• Mount Vernon Fire
• Clallam County Sheriff	• Port Angeles Fire Department
• Clark Regional Emergency Services Agency	• Port Angeles Police Department
• Columbia County Sheriff's Office	• Redmond Police Department
• Department of Fish and Wildlife	• Sequim Police Department
• Department of Natural Resources	• Snohomish County Police Staff and Auxiliary Service Center (SNOPAC) 9-1-1
• Edmonds Police Department	• Thurston County Fire District 13
• Grant County Sheriff's Office	• Walla Walla Public Safety Communications
• Grays Harbor E9-1-1 Communications	• Wenatchee Police Department
• Harborview Medical Center	• What-Comm
• King County	• Woodland Police Department
• Kitsap County Central Communications (CENCOM)	

Table 18 - Potential interoperability models

3.3 Upgrading systems

Responders were asked if they had plans to replace or upgrade their current systems. They also were asked to estimate the year of start and completion. Sixty-two percent of the responders indicated that they plan to make changes and to identify when the upgrade would begin and complete. See Figure 110, Figure 111, and Figure 112 for details.

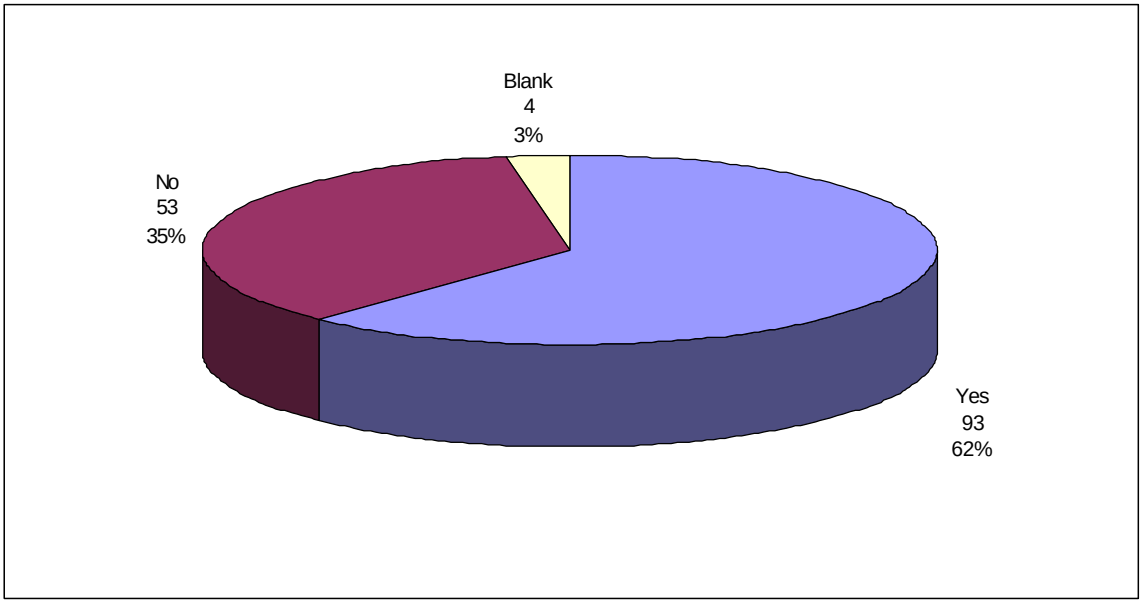


Figure 110 - Plans for upgrade within the next 5-10 years

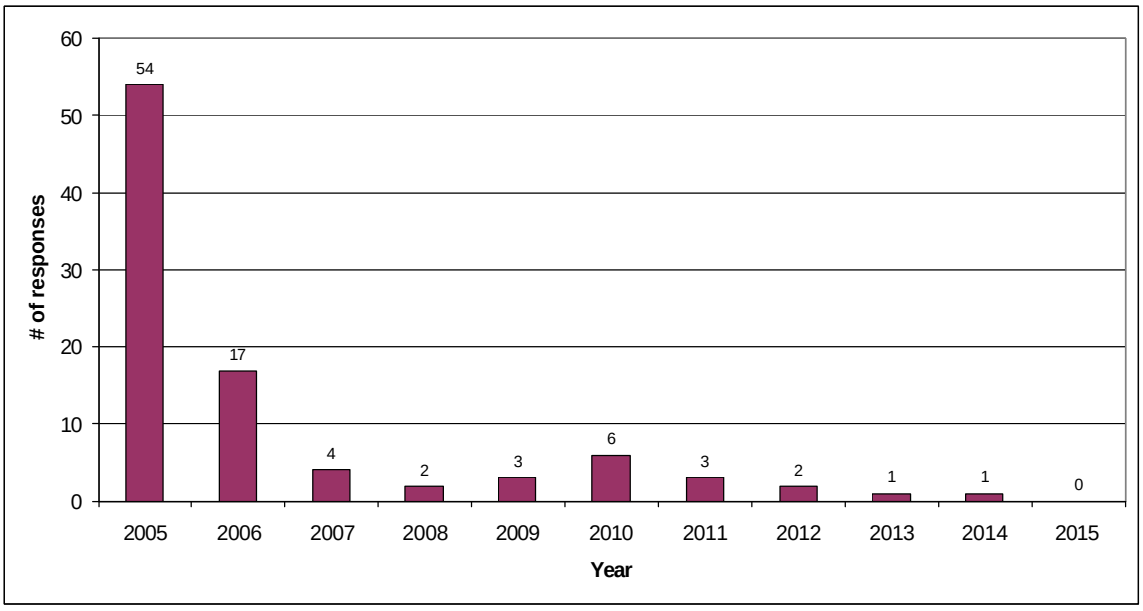


Figure 111 - Planned system upgrade - initiation

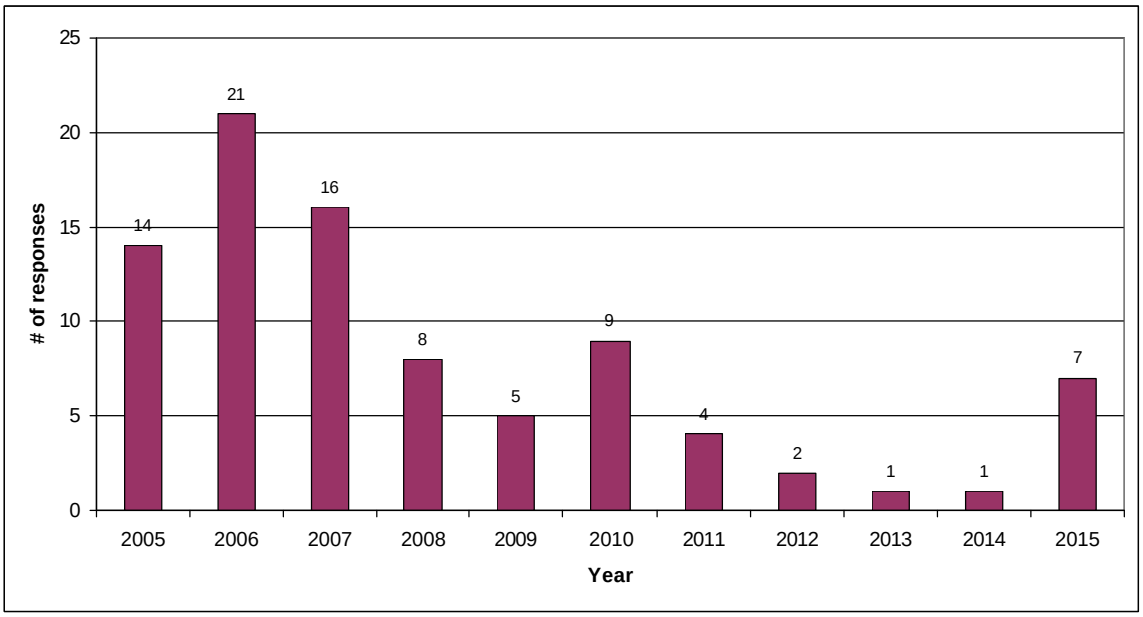


Figure 112 - Planned system upgrade - completion

3.4 Narrowband migration

Figure 113 show the responders who have plans to migrate toward narrowband channels.

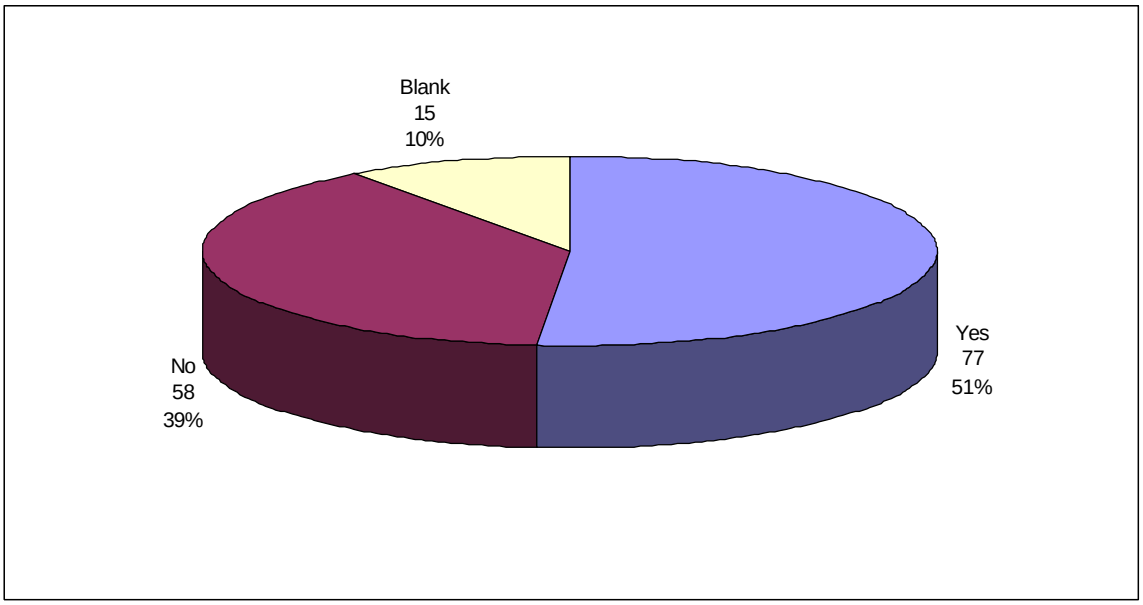


Figure 113 - Migration plans to narrowband

For the responders planning to migrate to narrowband, Figure 114 shows the beginning schedule date of the migration.

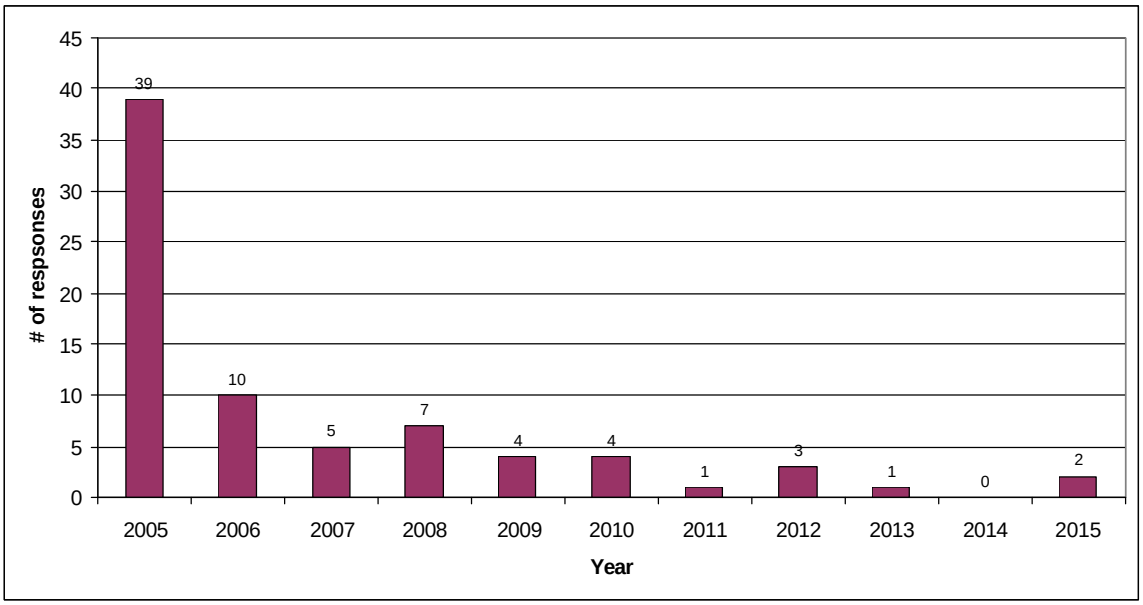


Figure 114 - Narrowband implementation

3.5 Source of funding

The majority of responders believed that funding for a new system will come from grants and local general funds.

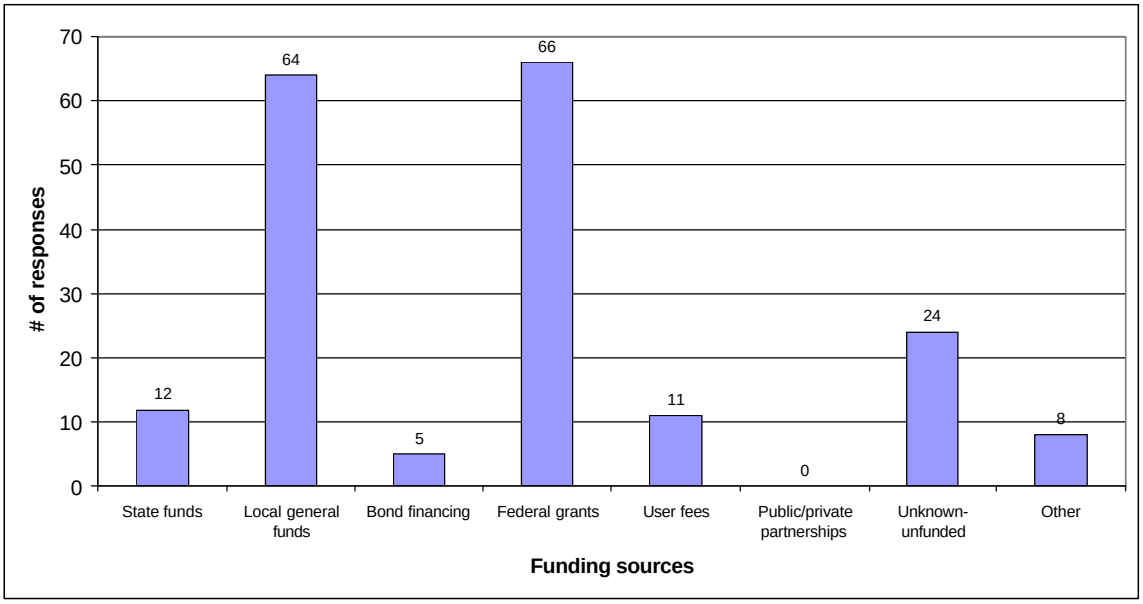


Figure 115 - Narrowband project funding sources

3.6 Conclusions

The following conclusions were drawn from the survey responses:

- Responders indicated that local general funds and federal grants would be the largest sources of funding for their projects.
- Cost recovery methods depended largely on general funds and grants.
- Subscriber and 9-1-1 fees are anticipated to provide large portions of the funding.

4 Governance

4.1 Awareness of the SIEC

The survey indicated that about two thirds of the responders were aware of the SIEC.

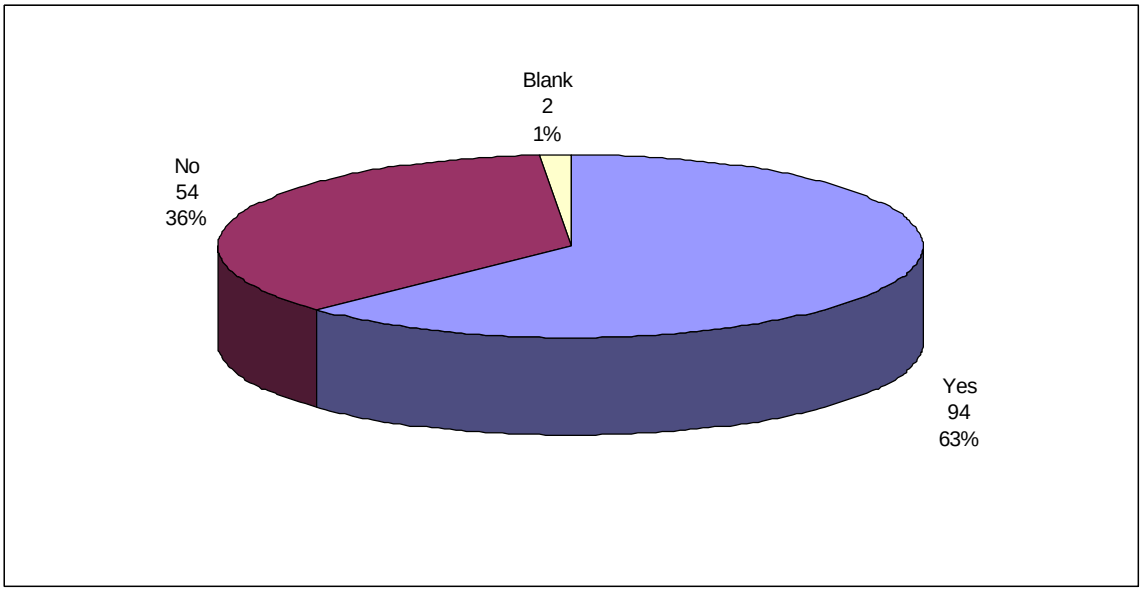


Figure 116 - Awareness of the SIEC

4.2 SIEC mission

The survey asked the responder to rate how well the SIEC is meeting its mission.

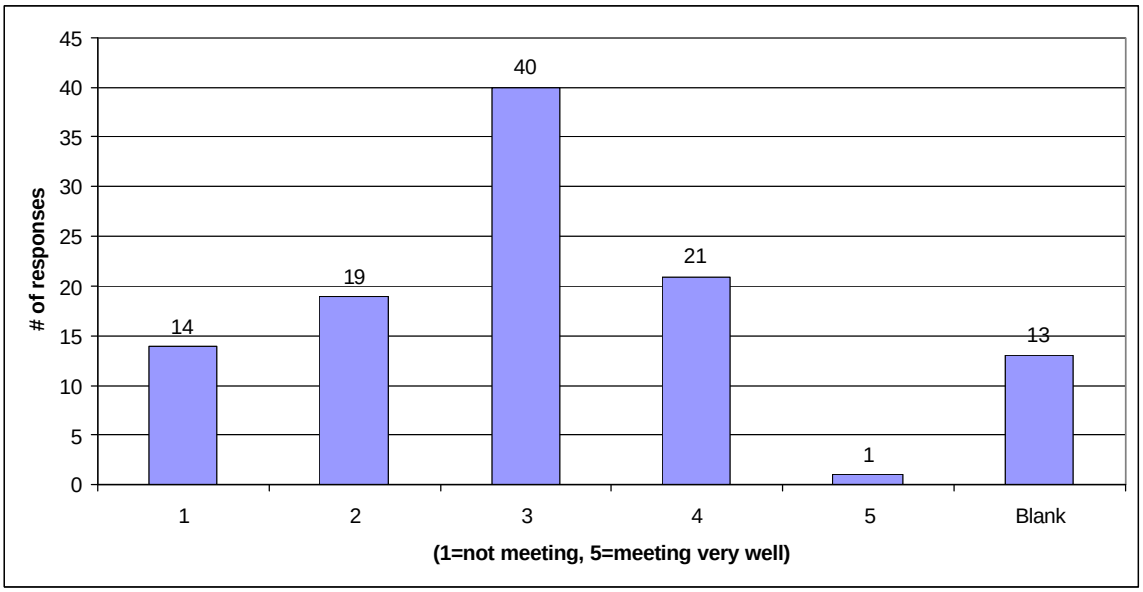


Figure 117 - Assessment of SIEC performance against mission

4.3 Conclusions

The following conclusions are drawn from the information provided in this part of the survey:

- Responders were asked to make recommendations to the SIEC in their area of membership. After categorizing their input, it was found that 62 percent (18 out of 29) of responders questioned their representation within the SIEC. Most responders wanted to see more local input.

- Outreach, funding and planning were identified by responders as areas in which change by the SIEC was needed.

- Sixty-three percent of responders were familiar with the SIEC. Responders appeared to be split on the performance of the SIEC. Most responders rated the SIEC at the mid-point (3) level, but more at the lower (1-2) than higher level (4-5).

- Sixty-two percent of the responders wanted increased representation by the SIEC. Improvements in outreach, funding and planning also were indicated as recommended changes in the SIEC's roles and responsibilities. Several agencies said they have a model that could be used as a model for interoperability.

- Sixty percent of responders indicated they plan to make changes in their system. Most indicated they plan to start in 2005. Half expected completion by 2008.

- Fifty-one percent have plans to migrate to narrowband channels. More than half planned to start this effort in 2005.

5 Summary

The approach that the SIEC and FE used was consistent with the overall approach recommended by SAFECOM. This method achieved a degree of standardization across projects as well as to ensure an ongoing linkage with similar efforts at the state and federal levels.

Engaging focus groups (regional forums) ensured a broad base of involvement and participation in the Web-based survey and provided invaluable information about the ability of the state and the local jurisdictions to communicate with each other and with state and federal partners. The forums brought to light a series of additional concerns and issues that are part of this report. The leadership and commitment demonstrated by the key stakeholders emphasized the importance of taking the time to complete the survey.

The survey results, coupled with the forums and interviews, have provided a sufficient level of information to be able to move ahead with the next phase of the statewide public safety communications interoperability planning process. The Web-based survey will remain available to all state/local agencies and tribal nations through the completion of the *Technical Implementations Plan* later in 2005.

6 Next steps

The publication of the *Inventory of Public Safety Communications Systems - Phase 2 Report* completes the assessment and inventory phase of the legislative requirements of the SIEC.

Next, the SIEC and FE will use this and other reports to develop a set of required system capabilities and user needs. The final *Technical Implementation Plan* report will:

- Document the functional needs and the desired system capabilities for all organizations expected to use the proposed improved system.
- Document and prioritize the operational, functional and technical baseline requirements.
- Conduct and document a detailed gap analysis comparing existing systems and processes to future requirements in order to understand the gaps that exist between the current environment and the future vision.
- Develop a set of alternative system architectures that could be utilized to address the needs, and an assessment of those alternatives.
- Develop a detailed analysis of the selected system architecture, including estimated costs and implementation approaches and issues.
- Develop a conceptual design of the selected alternative and incorporate all of the preceding results into an overall final communications plan.

As part of the above work effort, the SIEC will prepare a Request for Information (RFI) to be distributed to the vendor community. The responses from the vendors, as well as the documented system capabilities and user needs will be used to develop and evaluate alternative system architectures for the *Technical Implementation Plan*.

Appendix A - Survey

The following pages in this Appendix contain screen shots of the Web-based survey that was the basis for the information provided in this document.

Federal Engineering

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Washington SIEC Interoperability Study

Public Safety Radio Survey

Welcome to the Washington SIEC Interoperability Study Public Safety Radio Survey.

When you register you will receive an access code. This access code will permit you to return to the survey if you become disconnected or need to complete the survey at a later date.

Attention: All or part of this document may be exempt from public disclosure pursuant to RCW 42.17.310(1)(ww). Every effort must be made to control access to this document and the information it contains. This information is important to the security of the State of Washington's radio communications system and is for official use only. Only individuals with official capacity shall have access to this information, and the release of this information to others could threaten the security of the system.

Important! The survey has been divided into nine sections.

YOU MUST complete a section before disconnecting.

If you quit in the middle of a section, you will need to return to the incomplete section and re-enter your responses.

You may want to review a set of section questions, gather all information you may need
and then return to the section and complete it.

When you have completed a section, COMPLETED will display beside that section. With the exception of Administrative and Tower/Shelter information, you may still return to that section to view or edit your information before completing the survey.

Although you can view the list of towers/shelters entered and submit additional towers/shelters, once Tower/Shelter information has been entered it cannot be changed.

To start the survey, click on Section 2 - General Information to begin the survey.

The survey will not be submitted for inclusion in the database until you have completed all sections and submitted the completed survey.

If you are reading this, then you have not completed your survey. If you have entered all information into the survey and are ready to submit the data, please click here to complete your survey.

Completing your survey ensures that all data you have entered will be collected and processed by our system.

We appreciate your participation in the **Washington SIEC Interoperability Study Public Safety Radio Survey**.

Please complete the survey sections in order.

If information is not a valid response to a question, when you select the "Continue Button" the page will reload and a notation will appear next to the item(s)that needs to be revised. You **MUST** enter valid information and resubmit or the information will not be saved.

Click on Section 2 - General to begin.

Section #	Section Title	Organization/Agency (most likely to have information)
Section 1	Administrative	All
Section 2	General	All
Section 3	Mobile and Portable Radios	Initial Responder, State Agency
Section 4	Base Stations, Repeaters and Consoles	PSAP, State Agency
Section 5	Tower/Shelter Information	PSAP, State Agency
Section 6	Interoperability	All
Section 7	System Information	All
Section 8	Other Methods of Communicating	All
Section 9	Other Areas of Interest	All

Download PDF
(Will open in new browser window)
Please be patient it is a 59 page document.

If you are reading this, then you have not completed your survey. If you have entered all information into the survey and are ready to submit the data, please click here to complete your survey.

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Administrative Information

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In order to save your data, we need some information about you. Upon completion and submission of this form, you will receive a password. This password will allow you to restart the survey from this or another computer should you be interupted or need to change computers while taking the survey. Please remember, **YOU MUST complete a section before disconnecting** or you will have to start the section again from the beginning. If you don't complete the form and select the "Continue" button the selections you have made will **NOT** be recorded.

If information is not a valid response to a question, when you select the "Continue Button" the page will reload and a notation will appear next to the item(s)that needs to be revised. You **MUST** enter valid information and resubmit or the information will not be saved.

One last reminder - you DO NOT have to include commas in numbers (such as 10,000 just enter as 10000) and do not need to enter symbols like percentage signs (%) in answers just enter the raw data when requested.

Agency Name:	
Address:	
P.O. Box :	
County:	
City:	
Zip Code:	
Agency Radio Point of Contact (POC):	

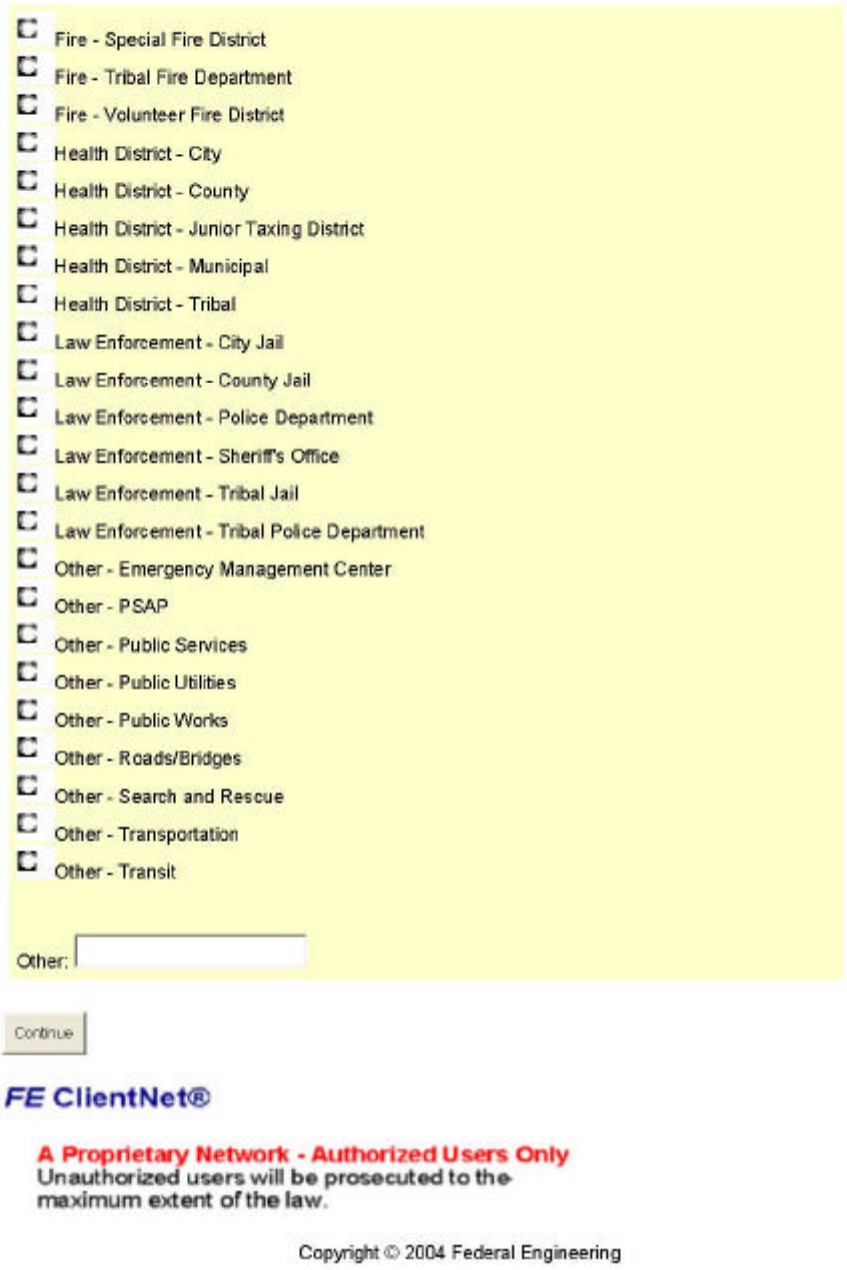
POC Telephone:	
POC Extension:	
POC Email:	
Person Completing Survey (PCS):	
PCS Telephone:	
PCS Extension:	
PCS Email:	

This Agency Represents (Select One)

- ☐ Government Entity - City Government
- ☐ Government Entity - Municipal Government
- ☐ Government Entity - County Government
- ☐ Government Entity - Tribal Government
- ☐ Government Entity - Federal Governement
- ☐ Government Entity - State Governement
- ☐ Private Company contracting with - County Government
- ☐ Private Company contracting with - City Government
- ☐ Private Company contracting with - Municipal Government

Description of Agency Mission (Select One)

- ☐ EMS - Government Operated EMS
- ☐ EMS - Non-governement Operated/Private EMS
- ☐ EMS - Other EMS
- ☐ Fire - City Fire Department
- ☐ Fire - County Fire Department/District
- ☐ Fire - Fire Marshal
- ☐ Fire - HAZMAT
- ☐ Fire - Industrial Fire District
- ☐ Fire - Municipal Fire District
- ☐ Fire - Fire Protection District


Fire - Special Fire District
Fire - Tribal Fire Department
Fire - Volunteer Fire District
Health District - City
Health District - County
Health District - Junior Taxing District
Health District - Municipal
Health District - Tribal
Law Enforcement - City Jail
Law Enforcement - County Jail
Law Enforcement - Police Department
Law Enforcement - Sheriff's Office
Law Enforcement - Tribal Jail
Law Enforcement - Tribal Police Department
Other - Emergency Management Center
Other - PSAP
Other - Public Services
Other - Public Utilities
Other - Public Works
Other - Roads/Bridges
Other - Search and Rescue
Other - Transportation
Other - Transit
Other:
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General Information

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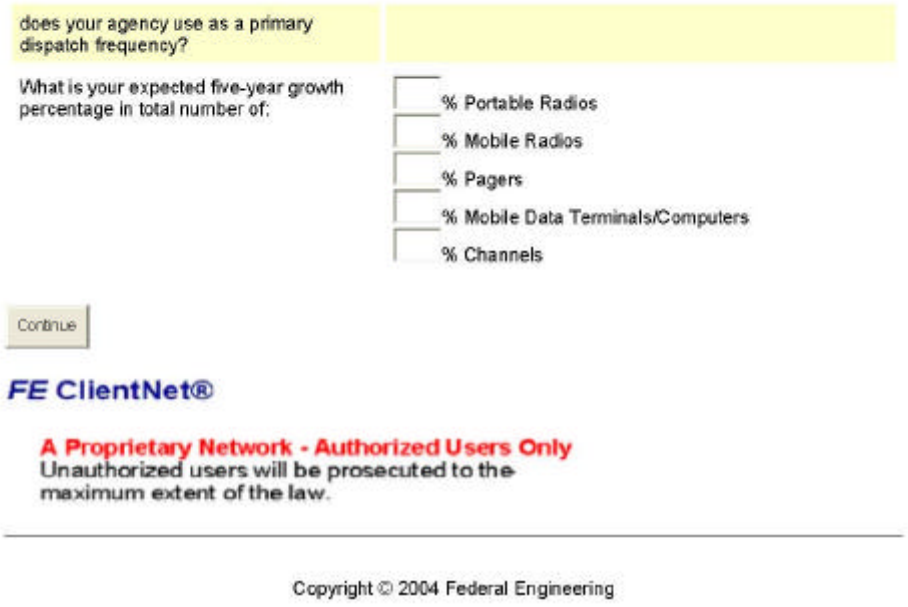
Please remember, **YOU MUST complete a section before disconnecting** or you will have to start the section again from the beginning. If you don't complete the form and select the "Continue" button the selections you have made will **NOT** be recorded.

On a scale of 1-5 (1 = low, 5 = high) please rate your overall satisfaction with the capabilities of your current radio system.	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
If not 4 or 5, why?	
Do you have any significant interference problems?	☐ Yes ☐ No
If yes, please describe:	

Who maintains your radio equipment?	☐ Another Agency ☐ Commercial Radio Shop ☐ Vendor ☐ Your Agency
Does your agency have at least one channel (frequency) that is designated as a Command and Control frequency?	☐ Yes ☐ No
What is the frequency?	
Does your agency have at least one channel (frequency) that is designated for communicating with other agencies?	☐ Yes ☐ No
If yes, what frequencies are used?	
Does your agency use any of the following frequencies as a primary dispatch frequency?	☐ Yes ☐ No
If yes, please select the appropriate frequencies by checking the box next to the frequency.	☐ 151.415 ☐ 155.370 ☐ 155.475 ☐ 156.135 ☐ 159.420
If not listed above, what other frequency	


does your agency use as a primary dispatch frequency?
What is your expected five-year growth percentage in total number of:
% Portable Radios
% Mobile Radios
% Pagers
% Mobile Data Terminals/Computers
% Channels
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Mobile and Portable Radio Inventory

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RADIOS

Portable Radios

Please identify the primary, secondary, and/or tertiary portable radio brands used by your organization. For the purposes of this survey, all equipment that you have in this category must equal 100%.

Primary portable radio manufacturer utilized:	please select from list
Secondary portable radio manufacturer utilized:	please select from list
Tertiary portable radio manufacturer utilized:	please select from list

Please answer each question as it relates to each vendor.	Primary Manufacturer	Secondary Manufacturer	Tertiary Manufacturer
Estimated quantity: (including spares)			

Average age of these portable radios:	Years	Years	Years
Approximate cost of portable radios when new:	$	$	$
Approximate cost of replacement/additional portable radios (currently being purchased):	$	$	$
What frequency band do these portable radios use? Please enter answers as a percentage of total.	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)
Percentage of portable radios that are P25 digital:	%	%	%
Percentage of portable radios that are P25 capable/compatible:	%	%	%
Percentage of portable radios that are digital, however NOT P25 capable/compatible:	%	%	%
Percentage of non-P25 portable radios that are narrowband:	%	%	%
Percentage of portable radios that are analog only:	%	%	%
Percentage of portable radios that are trunked:	%	%	%
Percentage of portable radios that are conventional:	%	%	%

Please identify the primary, secondary, and/or tertiary mobile radio brands used by your organization. For the

purposes of this survey, all equipment that you have in this category must equal 100%.

Primary mobile radio manufacturer utilized:	please select from list		
Secondary mobile radio manufacturer utilized:	please select from list		
Tertiary mobile radio manufacturer utilized:	please select from list		
Please answer each question as it relates to each vendor.	**Primary Manufacturer**	**Secondary Manufacturer**	**Tertiary Manufacturer**
Estimated quantity: (including spares)			
Average age of these mobile radios:	Years	Years	Years
Approximate cost of mobile radio when new:	$	$	$
Approximate cost of replacement/additional mobile radios (currently being purchased):	$	$	$
What frequency band do these mobile radios use? Please enter answers as a percentage of total.	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)
Percentage of mobile radios that are P25 digital:	%	%	%
Percentage of mobile radios that are P25 capable/compatible:	%	%	%
Percentage of mobile radios that are digital, however NOT P25 capable/compatible:	%	%	%

Percentage of non-P25 mobile radios that are narrowband:	%	%	%
Percentage of mobile radios that are analog only:	%	%	%
Percentage of mobile radios that are trunked:	%	%	%
Percentage of mobile radios that are conventional:	%	%	%

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Base Stations, Repeaters and Consoles

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BASE STATIONS, REPEATERS AND CONSOLES

Base Stations

Primary base station manufaturer utilized:	please select from list
Secondary base station manufaturer utilized:	please select from list
Tertiary base station manufaturer utilized:	please select from list

Please answer each question as it relates to each vendor.	Primary Manufacturer	Secondary Manufacturer	Tertiary Manufacturer
Estimated quantity (including spares):			

Average age of these base stations:			
Approximate cost of base station when new:	$	$	$
Approximate cost of replacement equipment:	$	$	$
What frequency band do these base stations use? Please enter answers as a percentage of total.	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)	% Low (25-50 MHz) % VHF (138-174 MHz) % 220-222 MHz % UHF (406-470 MHz) % 800 MHz (794-869 MHz)
Number of channels:			
Percentage of base stations that are P25 digital:	%	%	%
Percentage of base stations that are P25 capable/compatible:	%	%	%
Percentage of base stations that are digital, however NOT P25 or P25 capable/compatible:	%	%	%
Percentage of non-P25 base stations that are narrowband:	%	%	%
Percentage of base stations that are analog only:	%	%	%
Percentage of base stations that are trunked:	%	%	%

Percentage of base stations that are conventional:	%	%	%
What percentage of capacity is system operating today?	%	%	%
Percentage of equipment in base station configuration:	%	%	%
Percentage of equipment in repeater configuration:	%	%	%

System Performance
What performance metrics are monitored for these systems?

Reliability	Current performance	Current performance	Current performance
Utilization	Current performance	Current performance	Current performance
Other	Current performance	Current performance	Current performance
Satisfaction with current level of performance. (1=low, 5=high)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Consoles

Primary console equipment manufacturer utilized:	please select from list
Secondary console equipment manufacturer	please select from list

utilized:

Please answer each question as it relates to each vendor.	Primary Manufacturer	Second Manufacturer
Number of console positions:		
Console model number or type:		
Approximate cost of console when new:	$	$
Approximate replacement cost of console:	$	$
Average age of this console:		

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Public Safety Radio Survey

Tower/Shelter Information

Attention: All or part of this document may be exempt from public disclosure pursuant to RCW 42.17.310(1)(ww). Every effort must be made to control access to this document and the information it contains. This information is important to the security of the State of Washington's radio communications system and is for official use only. Only individuals with official capacity shall have access to this information, and the release of this information to others could threaten the security of the system.

Please complete this page for every Tower/Shelter for which you are responsible.

Each time you submit a tower you can either "Add another Tower" or finish this section by selecting the Completed button. Once you submit information for a tower, it cannot be edited or re-entered.

Please be sure your information is correct.

If at any time you wish to review the towers you have entered, click here.

TOWER INFORMATION				
Location	Degrees	Minutes	Seconds	
Longitude:				
Latitude:				
FCC tower registration number:				
Tower height:			Feet above ground level (AGL)	
Site elevation:			Feet	

Tower type:	☐ Self Supporting ☐ Guyed ☐ Water Tower ☐ Building ☐ Other If other, please specify type:
Age of tower:	Years
Tower structure condition:	☐ Excellent ☐ Good ☐ Fair ☐ Poor
Tower structure is:	☐ Owned ☐ Leased
Who maintains the tower structure?	
Are there other antennas on this tower?	How Many total:
What type of shelter does this site use?	☐ Part of Multi-use Building ☐ Separate Structure
What is the shelter condition?	☐ Excellent ☐ Good ☐ Fair ☐ Poor

Is there shelter space?	☐ Adequate ☐ Inadequate
Approximate amount of floor space available for expansion:	
HVAC systems - heating:	☐ Yes ☐ No
HVAC systems - ventilation only:	☐ Yes ☐ No
HVAC systems - air conditioning:	☐ Yes ☐ No
Primary electrical power by:	☐ Generator ☐ Commercial ☐ Solar ☐ Other If other, specify:
If generator is present, what is capacity?	(kVa/kW)

If generator is present, what is the fuel type?	☐ Diesel ☐ Gas ☐ Natural Gas ☐ Propane
Generator fuel supply runtime at load:	_____ (Hours)
Does the site have UPS?	☐ Yes ☐ No If yes, what is the capacity: _____ (kVa/kW) UPS Protection time at load: _____ (Hours)
Does the site/tower have adequate lightning/grounding protection?	☐ Yes ☐ No
What type of alarm is installed?	☐ Local ☐ Remote ☐ Both
What elements are alarmed? (check all that apply)	☐ Door ☐ Temperature ☐ FAA lighting ☐ HVAC failure

Year around access:	☐ Local ☐ Remote ☐ Both
Will the site support additional equipment?	☐ Yes ☐ No If no, what is the primary reason: ☐ HVAC ☐ Power ☐ Space

INTERSITE COMMUNICATIONS

What form of intersite communications are used to connect to radio sites?	☐ Terrestrial circuts ☐ Radio circuts ☐ Microwave ☐ Other types If other type, specify:

Please list all sites that are interconnected to this site by Terrestrial Circuts or other technologies:

Site 1	Name of site: ☐ Terrestrial ☐ Other

	Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 2	Name of site: ☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 3	Name of site: ☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 4	Name of site:

	☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 5	Name of site: ☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 6	Name of site: ☐ Terrestrial ☐ Other Bandwidth:

	Monthly cost: $ If this is the last site click here to move down to next section.
Site 7	Name of site: ☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 8	Name of site: ☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 9	Name of site: ☐ Terrestrial

	☐ Other Bandwidth: Monthly cost: $ If this is the last site click here to move down to next section.
Site 10	Name of site: ☐ Terrestrial ☐ Other Bandwidth: Monthly cost: $

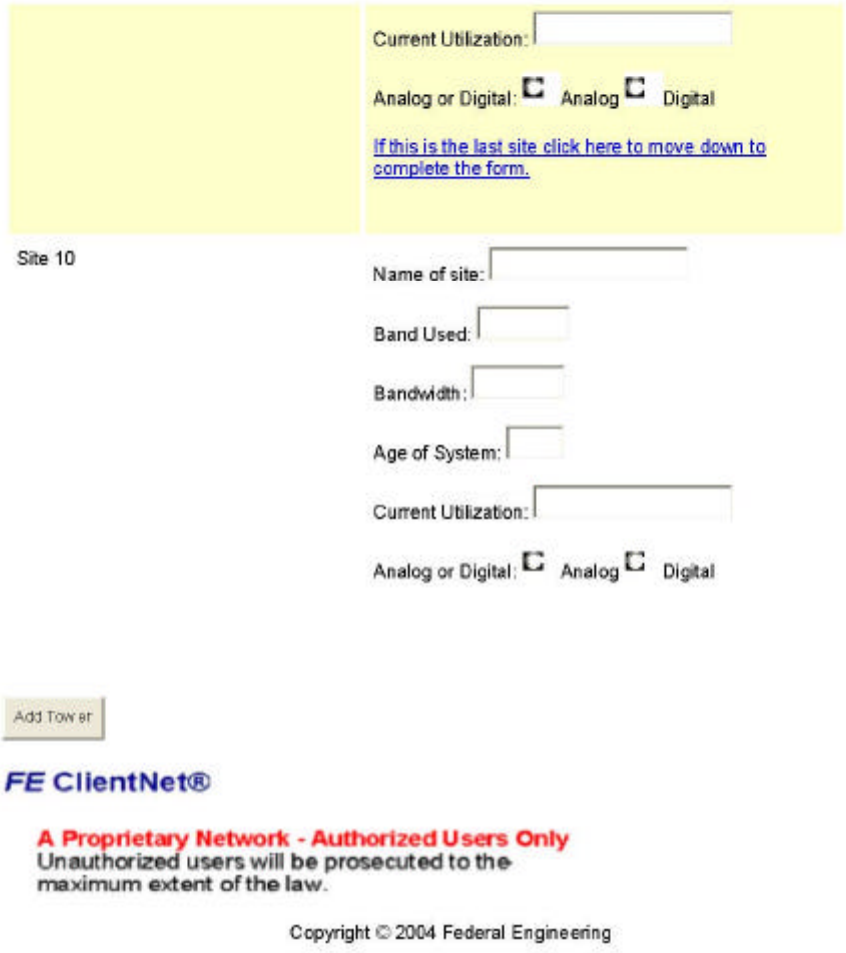
Please list all sites that are interconnected to this site by Microwave:

Site 1	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: ☐ Analog ☐ Digital If this is the last site click here to move down to complete the form.

Site 2	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.
Site 3	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.
Site 4	Name of site: Band Used: Bandwidth: Age of System:

	Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.
Site 5	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.
Site 6	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.

Site 7	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.
Site 8	Name of site: Band Used: Bandwidth: Age of System: Current Utilization: Analog or Digital: Analog Digital If this is the last site click here to move down to complete the form.
Site 9	Name of site: Band Used: Bandwidth: Age of System:


Current Utilization:
Analog or Digital: Analog Digital
If this is the last site click here to move down to complete the form.
Site 10
Name of site:
Band Used:
Bandwidth:
Age of System:
Current Utilization:
Analog or Digital: Analog Digital
Add Tower
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Washington SIEC Interoperability Study

Public Safety Radio Survey

Interoperability Information

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The intent of conducting an inventory of interoperability equipment is to assist with planning interim steps within the statewide interoperability action plan. Below is an inventory of the interoperability technology, which can serve as a resource to organizations responding to major incidents.

Does your agency dispatch their own calls?	☐ Yes ☐ No If no, is this contracted? ☐ Yes ☐ No Who does your dispatching:
What percentage of your calls involve mutual aid or assistance?	%
Please list the 5 most frequent multi-jurisdictional or multi-discipline emergencies that most often occur within your jurisdiction (excluding drills/exercises):	1. 2.

	3.
	4.
	5.
List all of the agencies that would typically respond to these emergencies:	1.
	2.
	3.
	4.
	5.
	6.
	7.
	8.
	9.
When these agencies responded to the emergency were you able to contact them via your land mobile radio system?	☐ Yes ☐ No
Did it require intervention by your dispatch or communication center?	☐ Yes ☐ No
Please list the top three large-scale operations or task force incidents that took place in your jurisdiction:	1.
	2.
	3.

List all of the agencies that would typically respond to these events:	1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ 8. ☐ 9. ☐
When these agencies responded to the emergency were you able to contact them via your land mobile radio system?	☐ Yes ☐ No
Did it require intervention by your dispatch or communication center?	☐ Yes ☐ No

Interoperability Equipment

Do you currently have any of the equipment or equivalent listed below?
If yes, please indicate the number of units that your agency possesses.

ICRI (Incident Command Radio Interface):	☐ Number of units
JPS/Raytheon ACU 1000:	☐ Number of units ☐ Capacity per unit
Other Gateway devices:	☐ Number of Units

Other Gateway Devices Specify type/brand and model of device:	
Console patch capability:	Number of simultaneous patches
Transpeaters:	Number of units
Satellite phones:	Number of units
Other, please specify:	
Does your agency have a way to connect two or more agencies without using a gateway device, or intervention by your communication center?	Yes No If so, please explain:
How effective do you believe cross patching is to effect interoperability?	Very effective Moderately effective Really does not work

On a scale of 1-5 (1 = low, 5 = high) rate your departments ABILITY, METHOD, and NEED to establish a radio communication link with each of the following levels of public safety agencies or organizations:

Local Law Enforcement:	Current need to interoperate 1 2 3 4 5 Current method of interoperating 1 2 3 4 5 Future need to interoperate

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Local Fire:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Local EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Local Transportation:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Local Public Service:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Local Port Police:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Other Local Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Other Local Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
IntraCounty Law Enforcement:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Current method of interoperating ☐ 1 ☐ 2 ☐ 3 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
IntraCounty Fire:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
IntraCounty EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
County EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
IntraCounty Transportation:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Future need to interoperate

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

IntraCounty Public Service:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1
Other IntraCounty Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1
Other IntraCounty Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

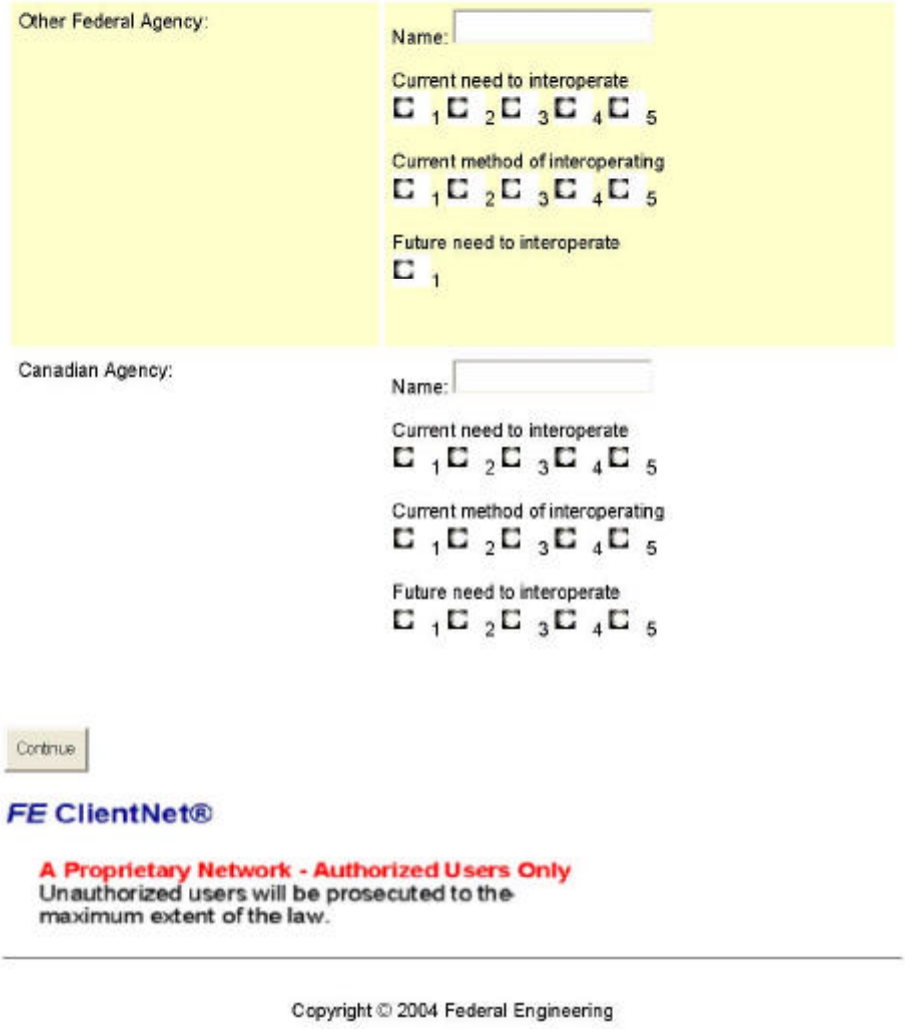
Neighboring/County/Local Law Enforcement:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Neighboring County/Local Fire:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Neighboring County/Local EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Neighboring County EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Other Neighboring County Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1
Other Neighboring County Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
State Law Enforcement:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
State EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate

	☐ 1 ☐ 2 ☐ 3 ☐ 4 5
Other State Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1
Other State Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Neighboring State Law Enforcement:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Neighboring State EOC:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Neighboring State Forest:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1
Other Neighboring State Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1
Other Neighboring State Agency:	Name: Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

FBI:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Coast Guard:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Federal Forest Service:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
FEMA/DHS:	Current need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Current method of interoperating ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need to interoperate ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5


Other Federal Agency:
Name:
Current need to interoperate
1 2 3 4 5
Current method of interoperating
1 2 3 4 5
Future need to interoperate
1
Canadian Agency:
Name:
Current need to interoperate
1 2 3 4 5
Current method of interoperating
1 2 3 4 5
Future need to interoperate
1 2 3 4 5
Continue
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Washington SIEC Interoperability Study

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System Information

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SYSTEM INFORMATION

The purpose of collecting information about personnel and system coverage is to assist with planning interim steps within the statewide interoperability action plan. Below is an inventory of the personnel and radio system coverage, which can serve as a resource to organizations responding to major incidents, and/or seeking potential partnerships or service providers.

System Capacity

Please indicate your satisfaction with the capacity that your current system offers: (1=low, 5=high)	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Please identify any events in your jurisdiction that cause a significant change in system capacity requirements:	

Does your system currently have sufficient capacity to meet these requirements?	☐ Yes ☐ No
Please identify any unusual or seasonal traffic patterns for your system:	

Support Personnel

Number of full-time-equivalent engineers:	Engineers are defined as: Performs professional research designing, development and testing of highly complex and technical electronic systems circuits to support the operations and maintenance of wireless communications systems. This position is considered the highest technical expert in a given area.
Number of full-time-equivalent, senior-level technicians:	Senior-level technician is defined as: Responsible for the maintenance of digital and analog telecommunication equipment and networks for an assigned geographic area. Coordinates field activities and assists telecommunication engineers in the overall operation of statewide telecommunication systems. Provides training to agency personnel and user customers.
Number of full-time-equivalent technicians:	Technicians are defined as: Performs skilled work in installing, maintaining and repairing sophisticated electronic communications systems equipment typically in a maintenance facility under the direction of a senior technician or engineer.
Number of full-time-equivalent communication center personnel:	
Number of full-time-equivalent system administration personnel: (managers, admin. support, etc.)	

System Coverage

Describe your coverage area requirements:	
Approximately how many square miles does your response area cover?	Square miles
What are your jurisdictional boundaries?	
If you have areas of poor coverage, please describe their locations and the nature of the coverage problem(s):	
What is the estimated percent of **mobile** coverage in your jurisdiction?	%
What is the estimated percent of **portable** coverage in your jurisdiction?	%
Please indicate on a scale of 1-5 (1=low,5=high) the degree to which you are satisfied with the coverage provided by your mobiles:	1 2 3 4 5
Please indicate on a scale of 1-5 (1=low,5=high) the degree to which you are satisfied with the coverage provided by your portables:	1 2 3 4 5
Please describe your area of coverage (percentage) mountains:	%
Please describe your area of coverage (percentage) high-rise or industrial buildings:	%
Please describe your area of coverage (percentage) valley land/ flat land:	%
Please describe your area of coverage (percentage) coastal areas:	%
Please describe your area of coverage (percentage) rolling hills:	%

Please describe your area of coverage (percentage) heavy forest:	☐ %
How many calls for service did you respond to in 2003:	☐
If available, how many calls for service did you respond to in 2002:	☐

System Functionality

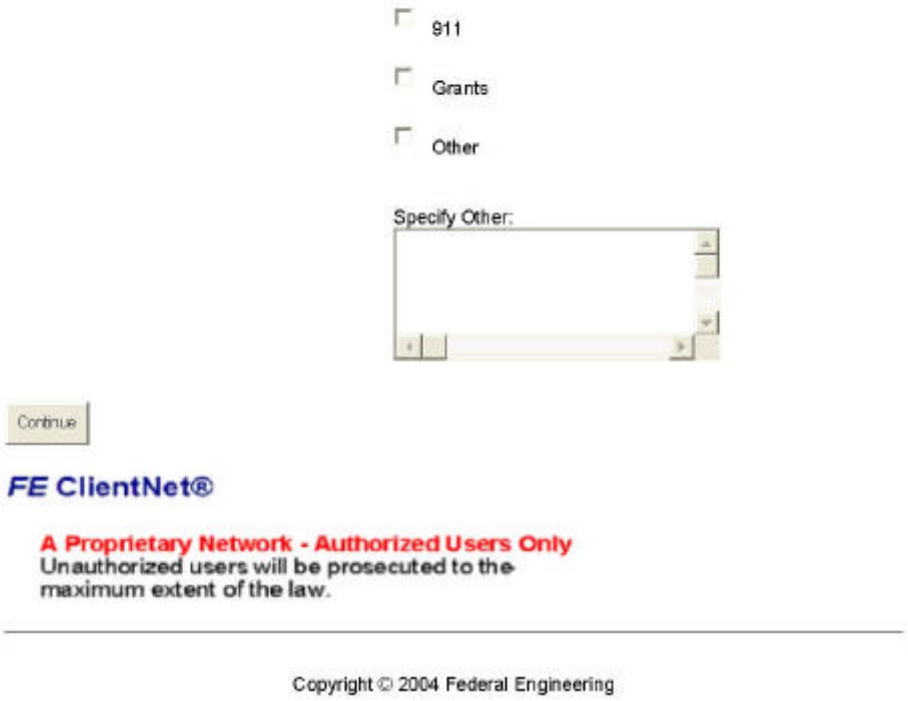
On a scale of 1-5 (1=little need, 5=great need) please rate the following system capabilities in terms of current and future (2-5 years) needs.

Statewide roaming:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Automatic Vehicle Location (AVL):	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Card/DL swipe:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Email from vehicle:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Subscriber ID:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Mobile printing:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Mobile video:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Mobile voicemail :	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Paging:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Encryption:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Voice recording:	Currently use ☐ Yes ☐ No Current need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Future need ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Operational Obstacles	
Please rate the following operational obstacles on a scale of 1-5: (1=low impact, 5=high impact)	Coverage ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Frequency availability ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Reliability ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Interoperability ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 System capacity ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Interference ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Other ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
	Specify:
On a scale of 1-5 rate your interest in the ability to use IP gateways to establish communications between various communications devices, including mobile radios, cell phones, PC's with voice cards, etc.:	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Frequency Planning	
Who is your contact for frequency planning?	
Contact for frequency planning telephone:	
Contact for frequency planning email:	
Incident Communications	
What type of incident communications planning template do you use for multi-agency responses?	☐ NIMS/ICS Template ☐ Form 205 Template ☐ Self Developed Template ☐ Ad-hoc for Each Incident ☐ Other Other please describe :
Cost Recovery	
Please indicate the method of cost recovery for this system, if any:	☐ General Fund by Owning Agency ☐ Subscriber User Fees


911
Grants
Other
Specify Other:
Continue
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Washington SIEC Interoperability Study

Public Safety Radio Survey

Other Methods of Communicating

Attention: All or part of this document may be exempt from public disclosure pursuant to RCW 42.17.310(1)(ww). Every effort must be made to control access to this document and the information it contains. This information is important to the security of the State of Washington's radio communications system and is for official use only. Only individuals with official capacity shall have access to this information, and the release of this information to others could threaten the security of the system.

Please remember, **YOU MUST complete a section before disconnecting** or you will have to start the section again from the beginning. If you don't complete the form and select the "Continue" button the selections you have made will **NOT** be recorded.

OTHER METHODS OF COMMUNICATING	
Cellular/Satellite Telephones	
Estimated quantity of cellular telephones:	
Estimated quantity of satellite telephones:	
Primary cellular service provider used:	
What percentage of your agency's jurisdiction has cellular coverage, from any cellular service provider?	%
Percentage of cellular phones that support text messaging:	%
Percentage of cellular phones with "Direct Connect"-type service:	%
Percentage of your non-administrative public safety communications done via cell phones:	%

Please list additional cellular providers in use:	
If your agency use satellite telephones, approximate number of phones?	
	Average minutes per month per satellite phone

Pagers

Estimated quantity of pagers:	
Primary paging service provider:	
What percentage of your agency's jurisdiction has paging coverage, from any service provider?	%
Percentage one-way paging:	%
Percentage two-way paging:	%
Percentage of pagers that support text messaging:	%
Please list additional pager providers:	

Mobile Data

Please identify the number of mobile data terminals/computers that your agency is using for mobile data.

Manufacturer 1:	
Type: (laptop/dumb terminal/etc.)	
Estimated Quantity:	
Manufacturer 2:	
Type:	

(laptop/dumb terminal/etc.)	
Estimated Quantity:	
Manufacturer 3:	
Type: (laptop/dumb terminal/etc.)	
Estimated Quantity:	
Who are the mobile data service providers?	
What percentage of your agency uses mobile data?	%
Is there a plan in place to increase the use of mobile data in your jurisdiction?	☐ Yes ☐ No

Characteristics of Mobile Data Use:	
Messaging:	☐ Using ☐ Planning to Use
Database Information: (NLETS, NCIC, etc.)	☐ Using ☐ Planning to Use
Still images: (mug shots, maps, building plans)	☐ Using ☐ Planning to Use
Video images:	☐ Using ☐ Planning to Use
Report writing:	☐ Using ☐ Planning to Use
Web access:	☐ Using ☐ Planning to Use

If using a commercial service provider, name provider:	
What type service is purchased? (i.e. CDPD ,EDGE):	
Percentage of units that are laptop based:	%
Mobile data transport protocol:	IP Other If other, identify:
Mobile Data Applications Accessed	
Local RMS:	Average transactions per user per week.
Local CAD:	Average transactions per user per week.
Local GIS:	Average transactions per user per week.
State DMV:	Average transactions per user per week.
State NLETS:	Average transactions per user per week.
NCIC-2000:	Average transactions per user per week.
Other:	Average transactions per user per week. If other, identify:

Continue

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Washington SIEC Interoperability Study

Public Safety Radio Survey

Other Areas of Interest

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Governance	
Are you aware that the State has created an organization called the State Interoperability Executive Committee (SIEC)? If yes, please answer the following questions. **If no, skip to the "Additional Information"section below.**	☐ Yes ☐ No
On a scale of 1-5 (1 = not meeting, 5 = meeting very well) how well do you feel that the SIEC is meeting its Mission of "In the interests of public safety, the State Interoperability Executive Committee (SIEC) pursues and promotes statewide interoperability policies and standards, which will ensure interoperable emergency communications."	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

What changes, if any, would you recommend for the SIEC in the area of Membership?	
What changes, if any, would you recommend for the SIEC in the area of Roles and responsibilities?	
Please identify any issues or recommendations concerning interoperability that you would like to inform the SIEC of at this time.	

Additional Information

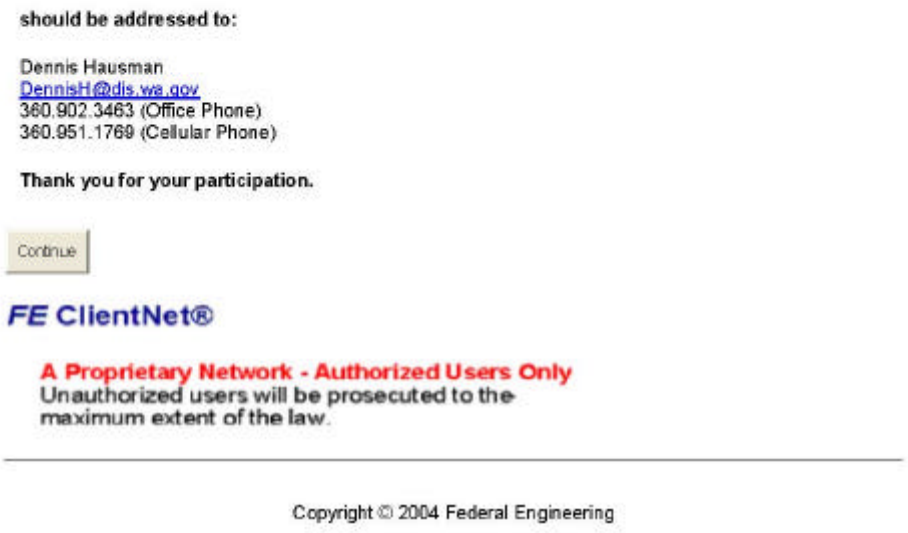
Does your agency currently have in place, or is planning any interoperable implementation that might serve as a model for review?	☐ Yes ☐ No
Please briefly describe your interoperability effort.	
Does your agency or department have plans to replace or substantially upgrade its land mobile radio system in the next 5-10 years?	☐ Yes ☐ No If so, when is that replacement scheduled to begin? ☐ 2005 ☐ 2006 ☐ 2007 ☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014 ☐ 2015
If a replacement/upgrade plan is scheduled to begin within the next 5-10	☐ 2005 ☐ 2006 ☐ 2007 ☐ 2008 ☐ 2009

years, what is the estimated year of completion?	☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014 ☐ 2015
Does your agency or department have plans to migrate to narrow-band communications?	☐ Yes ☐ No If so, when will this schedule begin? ☐ 2005 ☐ 2006 ☐ 2007 ☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014 ☐ 2015
How does your agency or department plan on funding the upgrade of your system (by percentage)?	____ % State Funds ____ % Local General Funds ____ % Bond Financing ____ % Federal Grants ____ % User Fees ____ % Public/Private partnerships ____ % Unknown/unfunded ____ % Other If Other please describe:

Technical questions regarding this inventory should be addressed to:

John E. Murray – Federal Engineering Program Manager
703 359-8200 x10 (office)
703 946-3626 (cellular)
jmurray@fedeng.com

Questions regarding this survey, or the Washington State Interoperability Executive Committee



should be addressed to:

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Thank you for your participation.

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Appendix B - List of participating agencies

State agency name
Department of Corrections
Department of Fish and Wildlife
Department of Health
Department of Natural Resources
Emergency Management Division, Military Department
Washington State Department of Transportation
Washington State Patrol

County	County agency name
Adams	Adams County
Benton	Benton County Emergency Services
Benton	Benton County Fire District #6
Benton	Benton County Fire District #4
Benton	Benton Public Utilities Department
Benton	Hanford Fire Department
Benton	Kennewick Police Department
Chelan	Cascade Medical Center
Chelan	Chelan County Fire District #4
Chelan	Chelan County Fire District #1
Chelan	Chelan County Fire District #3
Chelan	Chelan County Fire District #5
Chelan	Chelan County Sheriff's Office
Chelan	Peshastin Fire Department
Chelan	Rivercom
Chelan	Wenatchee Fire Department
Chelan	Wenatchee Police Department
Clallam	City of Forks
Clallam	Clallam County Sheriff's Department
Clallam	Clallam Transit
Clallam	Port Angeles Fire Department
Clallam	Port Angeles Police Department
Clallam	Sequim Police Department
Clark	Battle Ground Police Department
Clark	Camas Police Department
Clark	Clark County Sheriff's Office
Clark	Clark Regional Emergency Services Agency
Clark	Vancouver Fire Department
Columbia	Columbia County Sheriff's Office
Columbia	Emergency Management
Cowlitz	Castle Rock Fire & EMS

County	Agency name
Cowlitz	Castle Rock Police Department
Cowlitz	Cowlitz County 9-1-1
Cowlitz	Cowlitz County Fire District #4
Cowlitz	Cowlitz County Sheriff's Office
Cowlitz	Longview Police Department
Cowlitz	Woodland Fire Department
Cowlitz	Woodland Police Department
Douglas	Douglas County Sheriff's Office
Ferry	Ferry County Emergency Management
Franklin	Franklin County Sheriff's Office
Franklin	Pasco Fire Department
Grant	City of Warden Police Department
Grant	Grant County Fire Protection District #8
Grant	Grant County Sheriff's Office
Grant	Moses Lake Police Department
Grant	Multi Agency Communications Center
Grant	Royal City Police Department
Grant	Warden Police Department
Grays Harbor	Aberdeen Police Department
Grays Harbor	Chehalis Tribal Police Department
Grays Harbor	City of Ocean Shores Fire and Emergency Care Department
Grays Harbor	Grays Harbor E9-1-1 Communications
Grays Harbor	Grays Harbor Fire Department #11
Grays Harbor	Grays Harbor Sheriff's Office
Grays Harbor	Hoquiam Police Department
Grays Harbor	Montesano Fire Department
Grays Harbor	Montesano Police Department
Grays Harbor	Ocean Shores Police Department
Island	Island County Emergency Services Communications Center
Island	Island County Sheriff's Office
Jefferson	JeffCom 9-1-1 Communications
King	Bothell Police Department
King	City of Bellevue
King	Harborview Medical Center
King	Issaquah Police Department
King	King County
King	King County Jail - Department of Adult & Juvenile Detention
King	Kirkland Police Department
King	Medina Police Department
King	Port of Seattle
King	Redmond Police Department
King	University of Washington Police Department

County	Agency name
King	Valley Communications Center
King	Veteran Affairs Police Department
Kitsap	Bainbridge Island Police Department
Kitsap	Bremerton Police Department
Kitsap	Central Kitsap Fire and Rescue
Kitsap	Kitsap County CENCOM
Kitsap	Kitsap County CENCOM
Kitsap	Port Orchard Police Department
Kitsap	Poulsbo Police Department
Kittitas	KITTCOM
Klickitat	Goldendale Volunteer Fire Department
Klickitat	Klickitat County Fire District #10
Klickitat	Klickitat County Fire District #14
Klickitat	Klickitat County Fire District #5
Klickitat	Klickitat County Sheriff's Office
Lewis	Centralia Police Department
Lewis	Winlock Police Department
Lincoln	Davenport Fire Department
Lincoln	Lincoln County Sheriff's Office
Mason	Fire Protection District #5
Mason	Shelton Police Department
Okanogan	Okanogan County Fire District #6
Okanogan	Okanogan County Sheriff's Office
Okanogan	Okanogan Fire Department
Okanogan	Omak Police Department
Pacific	Pacific County Communications
Pacific	Pacific County Fire District #1
Pacific	Raymond Police Department
Pend Oreille	Kalispel Tribal Police Department
Pend Oreille	Pend Oreille County Communications Center
Pend Oreille	Pend Oreille County Corrections
Pend Oreille	Pend Oreille County Department of Emergency Management
Pend Oreille	Pend Oreille County Search & Rescue
Pend Oreille	Pend Oreille County Sheriff's Office
Pend Oreille	Pend Oreille Fire District #5
Pierce	Bonney Lake Police Department
Pierce	City of Buckley Fire Department
Pierce	City of Puyallup Fire & Rescue
Pierce	City of Tacoma
Pierce	Eatonville Police Department
Pierce	Fife Police Department
Pierce	Pierce County

County	Agency name
Pierce	Puyallup City Communications
San Juan	San Juan County Fire Protection District # 4
San Juan	San Juan County Public Works
San Juan	San Juan Fire District #3
San Juan	San Juan Island EMS
Skagit	Anacortes Police Department
Skagit	Burlington Police Department
Skagit	Mount Vernon Fire Department
Skagit	Skagit County Sheriff's Office
Skamania	Skamania County Sheriff's Office
Snohomish	City of Everett Fire Department
Snohomish	Edmonds Fire Department
Snohomish	Edmonds Police Department
Snohomish	Everett Police Department
Snohomish	Fire Department - City of Lynnwood
Snohomish	Granite Falls Police Department
Snohomish	Lake Stevens Police Department
Snohomish	Marysville Fire District
Snohomish	Mountlake Terrace Police Department
Snohomish	Mukilteo Fire Department
Snohomish	Mukilteo Police Department
Snohomish	Snohomish County Fire Protection District #25
Snohomish	Snohomish County Airport Fire Department
Snohomish	SNOCOM (Southwest Snohomish County Communications Agency)
Snohomish	Snohomish County Fire District # 7
Snohomish	Snohomish County Fire District #8
Snohomish	Snohomish County Fire District # 28
Snohomish	Snohomish County Fire District #18
Snohomish	Snohomish County Fire Protection District #27
Snohomish	Snohomish County Sheriff's Office
Snohomish	Snohomish Fire District #14
Snohomish	Snohomish Police Department
Snohomish	SNOPAC 9-1-1
Spokane	Cheney Police Department
Spokane	Spokane County Communications
Spokane	Spokane County Fire District #9
Spokane	Spokane Police Department
Stevens	Chewelah Volunteer Fire Department
Stevens	Stevens County 9-1-1
Stevens	Stevens County Fire District #2
Thurston	City of Lacey
Thurston	Lacey Fire District #3

County	Agency name
Thurston	Olympia Fire Department
Thurston	Olympia Police Department
Thurston	Southeast Thurston Fire / EMS
Thurston	Thurston County Fire District #6
Thurston	Thurston County Department of Communications - CAPCOM
Thurston	Thurston County Fire District #12
Thurston	Thurston County Fire District #5 - Black Lake
Thurston	Thurston County Fire District #13
Thurston	Thurston County Fire District #11
Thurston	Thurston County Fire Protection District #8
Thurston	Thurston County Sheriff's Office
Thurston	Tumwater Fire Department
Thurston	Tumwater Police Department
Wahkiakum	Wahkiakum County Sheriff's Office
Walla Walla	Walla Walla County Emergency Management
Walla Walla	Walla Walla Public Safety Communications
Whatcom	Bellingham Fire Department
Whatcom	Nooksack Tribal Police Department
Whatcom	What-Comm
Whitman	Malden Volunteer Fire and EMS
Whitman	Whitman County Fire District #6
Yakima	Granger Fire Department
Yakima	Union Gap Police Department
Yakima	Yakima County Fire District #14
Yakima	Yakima County Sheriff's Office
Yakima	Yakima Fire Department
Yakima	City of Yakima

Appendix C - Glossary of terms and acronyms

802.11	Wireless local area networking standards developed by the IEEE.
802.11a	802.11 version that provides up to 54 Mbps throughput in the unlicensed 5 GHz band, 8 channels, the higher frequency band limits its range to about 60 feet, not compatible with 802.11b or 802.11g; also known as Wi-Fi5.
802.11b	802.11 version that provides up to 11 Mbps throughput in the unlicensed 2.4 GHz band and is backward-compatible with 802.11, the original specification, 3 channels, effective range of about 300 feet, interoperable with 802.11g; also known as Wi-Fi.
802.11g	Most recently approved version of 802.11, provides 54 Mbps throughput in the unlicensed 2.4 GHz band, and is interoperable with 802.11b, effective range of about 300 feet.
Access fee	User fee for connecting to a network, usually monthly.
AES	Advanced Encryption Standard (successor of DES) will be a new Federal Information Processing Standard (FIPS) Publication that will specify a cryptographic algorithm for use by U.S. government organizations to protect sensitive (unclassified) information. NIST also anticipates that the AES will be widely used on a voluntary basis by organizations, institutions, and individuals outside of the U.S. government (see FIPS 140-1).
Agency	Term that applies generically to any local, state, federal entity or organization, such as; a department, division, city/town, or bureau. This includes government, quasi-government, and private groups.
AM	Amplitude modulation, whereby transmission continuously changes the signal strength to match the voice being transmitted, susceptible to man-made (car ignition, motors, etc.) and natural (lightning storms and other atmospheric disturbances) interference sources. Not used for PS communications since the late 1940s.
Analog	Radio signal that uses continuous changes in the amplitude or frequency of a radio transmission to convey information.
Band	The spectrum between two defined limited frequencies.
Bandwidth	The capacity of a telecom line or channel to carry signals. The necessary bandwidth is the amount of spectrum required to transmit the signal without distortion or loss of information. FCC rules require suppression of the signal outside the band to prevent interference.

Base station	A fixed, land station in the land mobile service (*e.g.*, the radio located at a fire or police station that either communicates directly or through a repeater to field subscriber units).
Blocked call	Whenever there are insufficient channels to grant a communication request, usually indicated by a fast busy signal.
Block grant	Federal grant funding that is allocated to state and local agencies based on a pre-determined formula.
Bluetooth	A short-range wireless communications protocol for connecting PDAs, computers, mobile phones, and accessories without cables. The range is slightly more than 30 feet and data is transmitted at 1 Mbps. Bluetooth includes device-registration and security capabilities that, for example, make sure your wireless headset works with your phone only, even if other Bluetooth phones are close by.
Bps	Bits per second.
Cellular	Mobile/wireless telephone communications is geographically broken into relatively small cells.
Channel	A connection between initiating and terminating nodes of a circuit. A single path provided by a transmission medium via an electrical separation, such as by frequency or frequency pairs.
CDPD	Cellular Digital Packet Data, original cellular data system, is being replaced by faster technologies on all digital cellular systems.
Co-channel	Interference resulting from two or more simultaneous transmissions interference on the same channel.
Collocation	Placement of multiple antennas or radio equipment at a common physical site or building.
Communications	Information transfer among or between users.
Communications interoperability	The ability of public safety agencies to talk across agencies and jurisdictions via public safety communications systems, exchanging voice and/or data with one another on demand, in real time, when needed.
Consequence management	The ability to contain and mitigate an incident, particularly a weapons of mass destruction **(**WMD) incident, including treatment of victims within a contaminated zone, their decontamination and evacuation, and local cleanup. Consequence Management also involves psychological treatment and other efforts to restore confidence in the social and economic well being of the incident area.

Conventional	Radio system with dedicated, single-purpose channels (can be shared between several users with different operational needs; *i.e.,* fire and police), user must select the specific channel to be used.
Coverage	The geographic area included within the range of a wireless radio system.
Cross-band	A repeater that receives in one frequency band and retransmits in a repeater second frequency band (see repeater).
Cycle	One complete performance of a vibration, electrical oscillation, current alternation, or other periodic process.
DES	Data Encryption Standard is a widely used method of data encryption using a private (secret) key. There are 72,000,000,000,000,000 (72 quadrillion) or more possible encryption keys that can be used. For each given message, the key is chosen at random from among this enormous number of keys. Like other private key cryptographic methods, both the sender and the receiver must know and use the same private key. DES applies a 56-bit key to each 64-bit block of data. The process can run in several modes and involves 16 rounds or operations. Although this is considered "strong" encryption, many companies use "triple DES", which applies three keys in succession. DES originated at IBM in 1977 and was adopted by the U.S. Department of Defense. Since there is some concern that the encryption algorithm will remain relatively unbreakable, NIST has indicated DES will not be recertified as a standard and submissions for its replacement are being accepted. The next standard will be known as the Advanced Encryption Standard (AES).
Dead spot	Geographic area within the normal coverage envelope where signals are below specification for minimal quality (see also blind spot).
Digital	Radio transmission method, replacing analog FM systems, that transmits binary 1's and 0's much like a computer. Generally digital signals can travel greater distances (better coverage), however once the signal levels are below minimum no communications are possible. As data is normally digital, data transmissions are very compatible with digital radios. Digital radios are generally small and consume significantly less power (longer battery life) than FM radios.
Discretionary grant	Federal grant funding distributed at the discretion of the agency administering the program funding, usually through a competitive process.

Dropped call	Radio call that is unintentionally discounted due to a system problem, lack of channel availability, or dead spot in coverage.
Dual band	Radio equipment that operates on two frequency bands.
Dual mode	Radio equipment that operates on both analog and digital networks.
Encryption	Encoding (and decoding) “scrambling” of transmissions to provide secure/private communications that can only be unlocked by the intended/authorized recipient(s).
FEClientNet	Federal Engineering’s Web-based client information capability.
FIPS 140-1	Federal Information Processing Standard, U.S. government standard for implementations of cryptographic modules, that is, hardware or software that encrypts and decrypts data or performs other cryptographic operations (such as creating or verifying digital signatures). The FIPS 140-1 standard was created by the National Institute of Standards and Technology (NIST); it specifies requirements for the proper design and implementation of products that do cryptography.
First responders	Individuals who are responsible for the protection of lives and property, normally the first professionals called to an incident or emergency, which provide immediate support services during prevention, response and recovery operations.
FM	Frequency modulation, whereby the transmission is constant in signal strength, but the center frequency varies in proportion to the voice being transmitted, eliminates most interference sources. Used for public safety communications since 1940s replacing AM - now being replaced by digital modulation. Note FM gradually fades away as signal strength is reduced by distance from the transmitter.
Formula grant	Federal grant that is allocated based on a predetermined statutory formula.
Frequency	The number of cycles or events of a periodic process in a unit of time.

Frequency bands The spectrum of transmission space where mobile radio systems operate in the United States. They are (from low-high):

High HF	25-29.99 MHz
Low VHF	30-50 MHz
High VHF	150-174 MHz
Low UHF	450-470 MHz
UHF TV Sharing	470-512 MHz
700 MHz	764-776 & 794-806 MHz
800 MHz	806-869 MHz
2.4 GHz	
4.9 GHz	

Frequency reuse Ability of channels/frequencies assigned to one location to be used again in another area with enough distance between them to prevent interference from affecting service quality.

Full duplex Mode of operation where the equipment is simultaneously transmitting and receiving, as in conventional or cellular phones. Requires two frequencies to create one channel. Generally not used in LMR systems.

Gateway A device that can transparently interconnect radio audio paths so that agencies can patch into each other's radio channels in real time. This can be done at the baseband level or using IP. A gateway provides interconnection between two networks with different communications protocols.

GPS Global Positioning System, a U.S. satellite system that lets persons/systems determine their position with extreme accuracy using GPS receivers, used by AVL technologies.

Grants Funding made available to local agencies from state and federal government agencies, as well as from private sources such as foundations.

Half duplex Mode of operation where the equipment transmits then receives over a single frequency allowing two-way communication, as in public safety mobile communications repeaters, base stations, mobile and portable units.

Handoff Process that automatically switches a user from the original tower site to an adjacent site with better signal quality.

ICS Incident Command System, combination of facilities equipment, personnel, procedures, and communications operating with a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Infrastructure	The hardware and software needed to complete and maintain a public safety communications system.
Interference	Extraneous energy, from natural or man-made sources, that impedes the reception of desired signals.
Interoperability	Ability of public safety personnel to communicate by radio with staff from other agencies, on demand and in real time.
Interoperability coordinator	An individual or individuals tasked with bringing together issues, solutions, policies, plans, and strategies relative to communications operability. The position focuses on improving interoperability communications at the local, state and federal levels of government.
Jurisdiction	The geographic territory where authority and operations are exercised.
Land mobile radio	A public or private radio service providing two-way communication, service paging and radio signaling on land.
Modem	An acronym for modulator/demodulator, which is a device that translates digital signals coming from a computer into analog signals that can be transmitted over standard telephone lines. The modem also translates the analog signals back into digital signals that a computer can understand.
Modular	Generic name for baseband cross-connect systems (similar to the interconnect ACU-1000), also known as an Intelligent Interconnect Systems.
Mutual aid	Generally describes a situation where a major emergency or incident requires a large number of agencies, including agencies from remote locations, working together to mitigate the crisis.
Mutual aid channel	A radio channel specifically allocated for use during emergency mutual aid situations.
Narrowband	In LMR systems, the FCC has specified reducing channel bandwidth usage from 25 kHz to 12.5 kHz, thereby doubling the number of available channels. Narrowband operations will be mandatory by Jan. 1, 2018, when all public safety users must cease operation of wideband equipment on or before that date. (See refarming).
NCIC	National Crime Information Center (national database of crime and criminal information operated by the FBI).
Network topologies	The shape of a local-area network (LAN) or other communications system. Topologies are either physical or logical.

P25 APCO Project 25, digital radio interoperability standard, adopted by federal government agencies, many law enforcement/public safety agencies, and all users of the 700 MHz band. After a slow start, it is now followed by most LMR manufacturers. It is still developing, with some incompatibility issues between vendors. The Phase I standard has been complete since October 1995, Phase II will extend Phase I standards into 6.25 kHz channels and TDMA transmission. Goals of Project 25: interoperability (greater safety and productivity with enhanced mutual aid), choices (suppliers), longevity (of technology/equipment), flexibility (to expand as resources and needs require), and economy (towards competitive sources).

Paging system Usually a one-way mobile radio system or service whereby a user carries a small, lightweight miniature radio receiver capable of responding to coded signals. These devices, called "pagers," emit an audible signal, vibrate, or display text messages when activated by an incoming signal. Two-way pagers are also available that allow the user to respond with a simple acknowledgment or send text messages.

Path In communications systems a route between any two points. In public safety communications, the route that (a) lies between a transmitter and a receiver and (b) may consist of two or more concatenated links. Note: Examples of paths are line-of-sight paths and ionospheric paths.

PBX Private Branch eXchange, a small telephone or voice switch that routes or interconnects voice traffic between consoles, repeaters, base stations and/or telephone lines.

PCS Personal Communications Service, any of several types of wireless, voice and/or data communications systems, typically incorporating digital technology, uses the 1900 MHz band. PCS licenses are most often used to provide services similar to advanced cellular mobile or paging services. However, PCS can also be used to provide other wireless communications services, including services that allow people to place and receive communications while away from their home or office, as well as wireless communications to homes, office buildings and other fixed locations.

PS spectrum Specific bands of frequencies set aside by the FCC for use by public safety agencies. They are: Low Band (25-50 MHz), VHF High Band (150-174 MHz), 220 Band (220-222 MHz), UHF Band (450-470 MHz), 700 Band (764-776 and 794-806 MHz), 800 Band (806-824 and 851-869 MHz) and 4.9 GHz Band.

PSAP Public safety answering point (usually a 9-1-1 center).

Receiver	The component(s) of a radio device that converts the radio waves into audible signals.
Refarming	FCC term to promote more efficient use of PLMR services that requires reduced channel bandwidth (from 25 kHz to 12.5 kHz) to create additional communications paths or channels on frequencies below 512 MHz. Mandatory refarming date is now set for January 1, 2018 to operate only narrowband equipment. The FCC is also considering a second bandwidth reduction (to 6.25 kHz), for a date yet to be determined.
Repeater	Special receiver/transmitter combination that receives a signal on one frequency and retransmits a new signal on another frequency, usually within the same frequency band, sometimes referred to as a relay station.
Roaming	Use of a wireless phone or public safety mobile communications (PSMC) equipment outside of the "home" service area defined by a service provider or system. Allows a user to travel statewide and communicate as if they were still in within their local area.
Satellite	Radio relay station (repeater) that orbits the earth. A complete satellite communications system also includes earth stations (and portables/mobiles) that communicate with each other via the satellite. The satellite receives a signal transmitted by an originating earth station and retransmits that signal to the destination earth station(s)/receiver(s). Satellites are used to transmit telephone, television and data signals originated by common carriers, broadcasters, distributors of cable TV program material and for PSMC use into areas of coverage dead spots.
Satellite phone	Wireless phone that uses mobile satellite services to communicate where PSMC or cellular coverage is poor.
Satellite receiver	See voting receiver.
Scanner	Radio receiver (and sometimes transmitter) that moves across a wide range of radio frequencies and allows users to listen (and then transmit) on any of the licensed/authorized frequency.
Simplex	One-way communications (*i.e.*, public address or broadcast systems).
Simulcast	Signaling technique that transmits the same signal from multiple sites.
SMR	Specialized Mobile Radio, a dispatch radio and interconnect service for business, using 220 MHz, 800 MHz, and 900 MHz bands.

Spectrum	The range of electromagnetic radio frequencies used in the transmission of sound, data and television.
Spectrum allocation	Federal government designation of a range of frequencies (frequency bands) for a category of use(s). For example, the FCC allocated the 1900 MHz band for PCS. Spectrum demand and new technologies can shift existing allocations. The UHF-T and 700 MHz bands were created by removing broadcast television from these frequencies.
Spread spectrum	Jam resistant technology that "spreads" information over a wider bandwidth than is necessary that provides interference tolerance, originally devised for military use.
Subscriber	User, customer on a network.
Subscriber unit	User's equipment (usually a mobile or portable radio).
T1	Digital circuit at 1.544 Mbps, capable of 24 DS-0s (non-compressed voice channels), data, video, or any combination (see DS-1).
Talk group	Users assigned to a specific group that normally communicate with each other. Primarily preprogrammed into a trunk system, but can be assigned on-the-fly to add other users to interoperate with the group during emergencies or joint operations.
TCP/IP	Transmission Control Protocol/Internet Protocol, a suite of protocols (standards) for digital transmissions, originally developed by DOD. Used on most networks *e.g.*, email and Web browsing are two of the more common uses.
Terminal unit	User's equipment (usually a mobile or portable radio).
Transceiver	Combination transmitter and receiver, PSMC base stations, mobiles and portables are examples.
Trunked	Radio system with a group of channels available and assigned as needed to specific "groups" or uses. All channels are automatically system assigned while in-use, then released for other users. Maximizes traffic in a minimum number of channels. FCC preferred method of operation (especially for new systems).
Turnkey	Entire system with hardware and software assembled and installed by a vendor and sold as a package.
UHF	Ultra High Frequency, the part of the radio spectrum from 300 to 3000 MHz, which includes broadcast TV Channels 14 and higher, lower frequency microwave and some marine, aviation and land mobile services.

UHF PS	Band Frequencies between 450 and 470 MHz for public safety use.
VHF	Very High Frequency, the part of the radio spectrum from 30 to 300 MHz, which includes broadcast TV Channels 2-13, the FM broadcast band and some marine, aviation and land mobile services.
VHF Hi Band	Frequencies between 150 and 174 MHz.
VHF Lo Band	Frequencies between 25 and 50 MHz, also known as Low Band.
Vocoder	A device that breaks speech patterns into components, allowing them to be re-transmitted efficiently over a narrow bandwidth.
Voting receiver	Multiple remote receivers tied together through a comparator device at a transmitter site to improve portable coverage, signal strength is compared from each receiver, and the best receiver becomes the receiver during a specific transmission. Also called a satellite receiver.
Wi-Fi	Wireless Fidelity, common name for IEEE 802.11b wireless LAN standard using 2.4 GHz frequencies.
Wi-Fi5	Wireless Fidelity 5, common name for IEEE 802.11a wireless LAN standard using 5 GHz frequencies, not compatible with Wi-Fi.
Wideband	In LMR systems, most channels are of 25 kHz bandwidth for voice communications.